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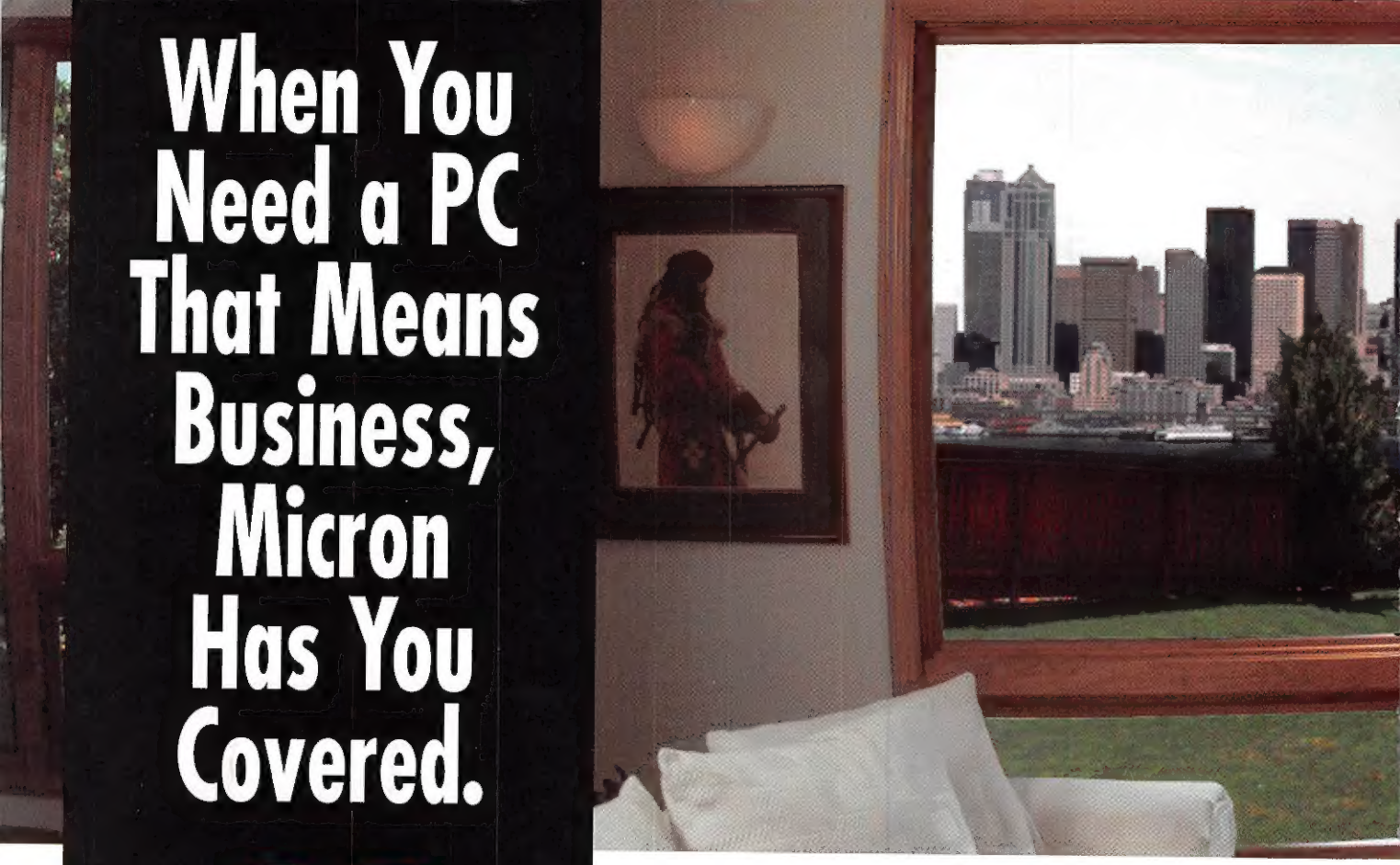

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JUNE 25, 1996
MILLENNIA P166

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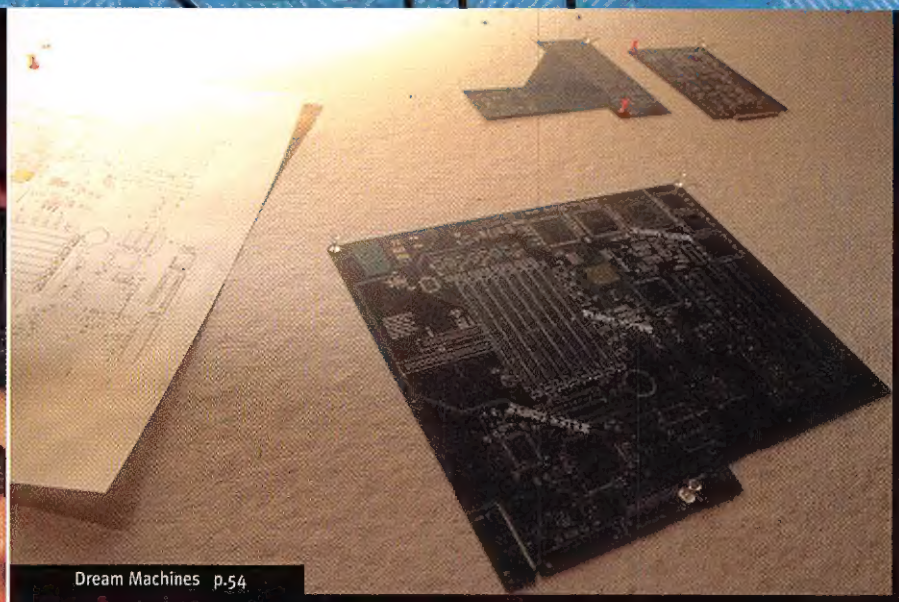

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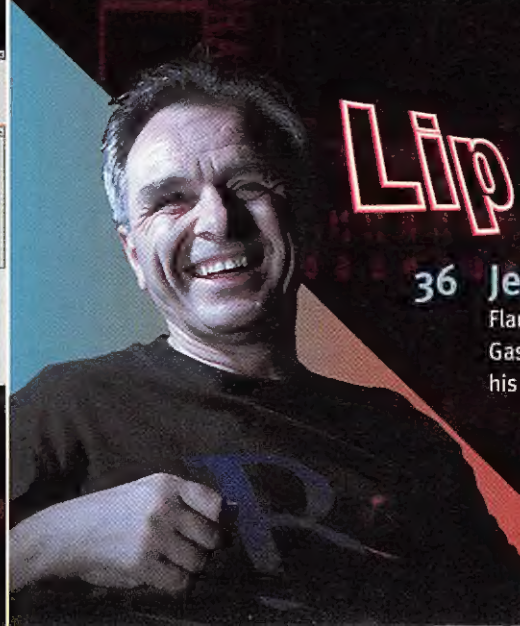
When your old system's get up and go has got up and went, and an off-the-shelf- system just won't feed the need, **boot** tells you how to bring together the components that will blaze their way into your heart and imagination. Build your $5K **dream machine**... now!



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EDITOR'S WORDS

Step up!

Let me be the first to welcome you to the future. *boot* magazine is here and nothing will ever be the same. Then again, some chaos theorists would argue nothing ever has been the same.

What we're dealing with in these pages is a serious obsession. An innocuous box that occupies a few square feet on or under the desk but manages to take up the majority of our thoughts and imagination. This could be a good thing or a bad thing. I think it's a good thing, but you've gotta ask yourselves a few questions.

Have you got the love? Deep down, does your blood burn for your PC? Imagine cracking the case on some bleeding-edge new machine and gazing in on state-of-the art boards that make the seemingly impossible possible. Getting warm?

This experience is nothing new. The hard-core loyalist has been at the center of the whole evolution of the personal computer. From those first persistent kit crunchers that braved the darkness to watch the lights flash on an Altair, to the computer clubs that spawned Steve Jobs, Bill Gates, and so many other Promethean influences. The desire to tap the seemingly primordial power of the PC has fueled the growth of this now-dominant industry.

The power user, the early adopter, the geek. Whatever we are called, we are the glue that holds the industry together, the axle that powers all the divergent spokes that make the growth of the architecture move forward. And our time has come.

Now is a great time to be a power user, because the technologies at the core of the PC are reaching previously unfathomable heights, and the overall platform is stepping up to the challenge set forth by the next generation platform machines. I've seen the future of software running on 200MHz Pentium-based machines with memory to burn and 3D cards performing rendering tricks based on dead mathematicians' theories. And let me tell you, I'm blown away.

And like a good prom date, they're not only beautiful, they're smart.

Game design has advanced so far beyond the simple twitch games that inhabited the corner pizza parlor. Today's sims have put the intelligence back into A/I. If you have the time, savvy, and inclination you can fight the Battle of the Bulge, accurate down to the smallest details. And if you're good, you *might* win.

All this is not to say that everything produced for the PC is this amazing. No. The majority of software and hardware pumped out for mass consumption continues to pander to the lowest common denominator. The term "home system" has become synonymous with "second-rate," and too much software is designed with packaging placed before gameplay in priorities. The hard-core home PC owner has the love. That PC owner has relentlessly pushed the envelope, and today's mind-blowing systems and software exist explicitly for that individual.

That's where we come in. We know what you want. We dig your pioneer spirit because we share that spirit. Every single month, we bust our asses to seek out the very best and thrash the rest. And we do it for the love. Anytime we hear even a rumor about some new technology or title, we want to be the first to see it, hear it, touch it, feel it. When the FedEx man rolls his dolly-full of boxes into the bootLab, we break cadence and tear into the latest batch of toys and tools. We're passionate and we know you are too.

So come along. We're gonna have a blast!

— Brad Dosland

PHOTOGRAPHY:
MARK MADEO: COVER; LIP
AARON LAUER: RENDERING; 200MHZ MONSTERS

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LETTERS TO THE EDITOR

Death becomes us

My reward for renewing my subscription to *CD-ROM Today* is apparently the death of the magazine. I subscribed (note the past tense) because every month you gave me a large number of CD-ROM reviews, something the other magazines I subscribe to don't. The included CD allowed me to calibrate my views and tastes against those of your reviewers. It also gave my great-nephew something to do when his father brought him over to our house.

But the July issue informs me that you're turning my magazine into a boot camp PC magazine.

I can't imagine why you'd do this. You have one chance with me. If I don't like it, then you'll get the boot, not me. I'll just get a refund.

Jeff Smith
via Internet

Thanks for writing. We're glad you enjoyed CD-ROM Today *and its definitive reviews, and we're proud that we earned the reputation as "the CD-ROM authority." We're also proud that we've always offered much more than reviews—like the Disc, tutorials, insightful features, and news and views from respected columnists.*

That's why we think you'll find boot *more than appealing. We have a new and improved bundled CD-ROM: the* bootDisc. *We give you plenty of insight into new products (this month more than 40 software titles and hardware products are previewed and reviewed).*

You'll find much of what CDRT *had to offer in the pages of* boot. *We've just taken the best and made it better.*

Captive audience

I am presently incarcerated at the Keogh Dwyer Correctional Facility in Newton, N.J. Myself and other members of a select group of "trustee" inmates, in conjunction with classes sponsored by the Sussex County Community College, are hard at work studying to become computer literate. We all hope that the skills we learn will help us become better, more productive members of society through employment in some related field.

I recently had the privilege of reading your magazine and derived hours of pleasure. Your concept of combining text material with a CD-ROM in monthly installments is truly unique and borders on the revolutionary. I think your magazine is stellar!!

Keep up the good work.

Please send me subscription information. (If you would keep in mind: I only earn 78 cents per day. If you have discounted subscriptions, it would be greatly appreciated.)

If you could also send us some old *CD-ROM Today* issues, they would be of great use to myself and the other students in our further studies.

Thank you,
Brian Schultz

Thanks for writing Brian. You should have the back issues by the time you read this; unless, of course, boot *and* CDRT *somehow get swiped before they reach your cell, er, classroom.*

Gamers only?

I think *boot* has great promise. Your articles are well-written, but they try to please all the people (any PC user) all the time rather than some of the people (game players) all the time.

If you concentrate on a single market—game players—then the magazine can include all sorts of articles (about equipment, software, trends, etc.).

I have a couple of suggestions: Your reviews should focus solely on how equipment can perform in relation to "gaming." There's nothing wrong with mentioning RAM and cache, but please *relate* it to games. There are already too many magazines with general computer reviews.

Steve Schwartzman
via Internet

We don't try to please just any PC user. We love the obsessive types—guys that prefer to let their forehead hit their joystick with a thump at 2 a.m. rather than a soft down pillow.

Seriously: It's true that games are pushing the envelope of technology. Your suggestion to relate new system and component performance to real-world gaming is a good one, and we actually figured that one out on our own.

No, we won't give you general computer reviews. boot *editors like what you like: the stuff that gets in your blood, the games that make your adrenaline pump, and the PCs so intimidatingly powerful they make you drool.*

Thanks for the suggestions. We hope you enjoy this premiere issue. And remember, we're only gonna get better.

Power Rangers

One of the challenges we face in the education software business is teaching young people subjects, such as math and English, while entertaining them at the same time. *Power-active Math and Words* do just this (reviewed *CD-ROM Today*, July 1996). *Power Rangers Zeo* is the number one television show for boys and girls ages 2 to 11 in the United States. What better way to get children interested in these subjects than through teamwork with their favorite super heroes?

Peter Lefevre's statement that "the only children who might improve their academic skills by using these discs are kids who have attention span problems," shows a misunderstanding of the basics in teaching young people. The best way to improve skills in these key academic areas is through attention, focus, and repetition. He continues, "Otherwise math and English deserve to be treated like the scholarly pursuits that they are, even in the younger grades."

I believe that it does no good to have the most effective tools for training math and English available if kids won't spend time with the product.

J. David Hoch
vice president
Interactive Development

No doubt Power Rangers Zeo *is a popular show, but that alone does not justify using that violent theme to expose young children to basic education principles. The hyper violence of the TV show, and these CD-ROMs, is abhorred by many, including professional educators. While the movie* Pulp Fiction *might also succeed in getting children's attention, it would make a bad vehicle to teach social studies to elementary school kids . The educational challenge is not so great that relevance and context need be ignored. We prefer educational titles that focus on learning more than chop-sockey hijinks.*

Pacified... not!

Thank you for your review of our *Pacified* CD (*CD-ROM Today*, July 1996).

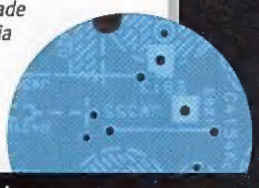
I agree that even our Macintosh version is "amateurish" and you make many solid points in your review. In the past we have solicited support from many record labels and been turned down, so we were forced to record in our basement. I'm a much better musician that I am a producer, but I'd like to be heard!

While there is some motion in our disc, I must say that QuickTime movies suck. Video machines still kick severe butt on all but the most expensive computers—face it! My Super 8 movie camera can produce better looking stuff than my PowerMac 6100.

As far as our disc's simple interface goes, all I can say is I hate computer games. This is an art display.

Evan Symons
Step and a Half Records
Vancouver, BC

Reviewer Adam Douglas responds: I understand that your disc was recorded on a low budget. However, we must grade your disc with the same criteria we would use for any other disc. I commend you for taking a chance and releasing Pacified *all by yourself.*



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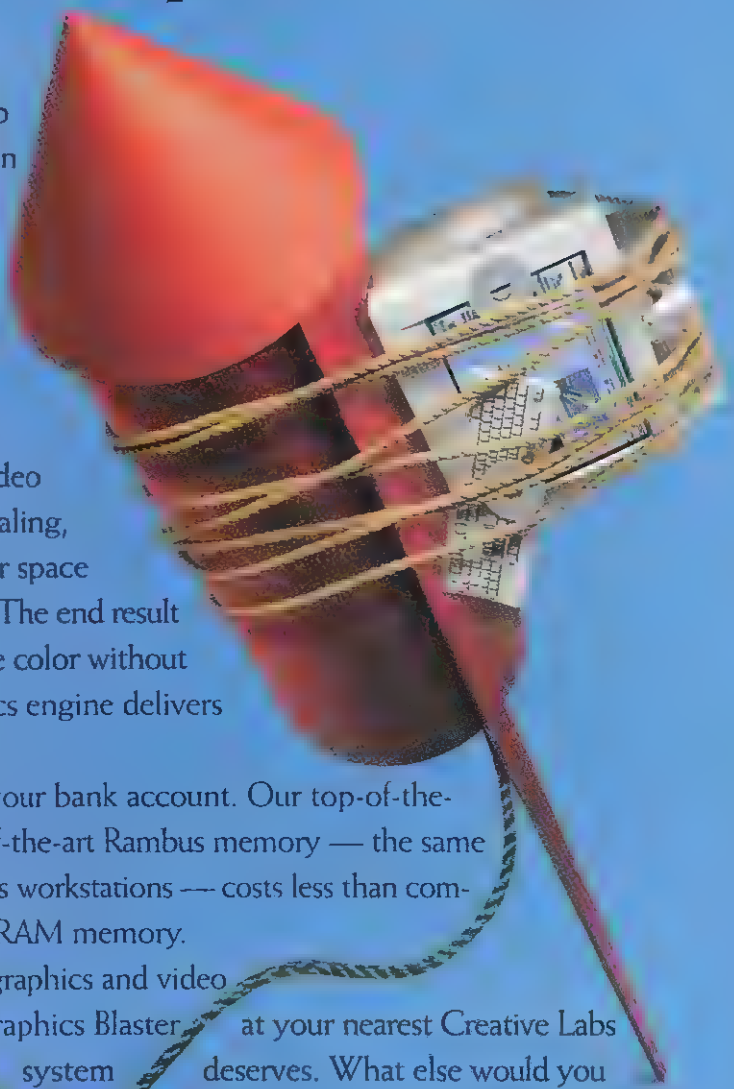

Multimedia can be a frustrating thing. Even on today's hottest systems, video playback can end up looking like a postage stamp with fewer colors than you get from a box of crayons. Or, when you zoom it to full screen, it looks like a slide show instead of a smoothly running movie. Before you resort to extremes, you might want to try our new Graphics Blaster™ multimedia accelerator from Creative Labs.

Graphics Blaster features high-tech video acceleration functions like asymptotic scaling, horizontal and vertical filtering and color space conversion built right into the hardware. The end result is video that glides onto the screen in dazzling true color without dropping frames. And the powerful 64-bit graphics engine delivers Windows® performance that will blow you away.

Best of all, Graphics Blaster won't blow away your bank account. Our top-of-the-line Graphics Blaster MA302 with 2MB of state-of-the-art Rambus memory — the same high performance memory used on Silicon Graphics workstations — costs less than comparable boards using yesterday's tired VRAM memory.

So when you're ready to boost your graphics and video performance to the stratosphere, pick up a Graphics Blaster at your nearest Creative Labs dealer. It's got the multimedia muscle your system deserves. What else would you expect from Creative Labs, the leader in high-performance multimedia products.

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Product Information Number 96

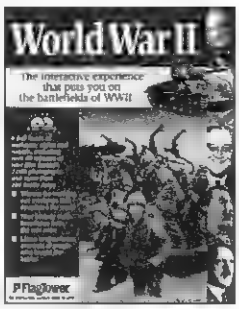
CyberMedia

Tap into the world's largest knowledge base of solutions to over 10,000 Windows 95 and Windows 3.1 problems. Also available in a deluxe PC edition.

[PC: WIN 3.1, WIN 3.11 or WIN 95; 386; 4mb]

Vendor Price: $69.95

Borders Price: $49.95



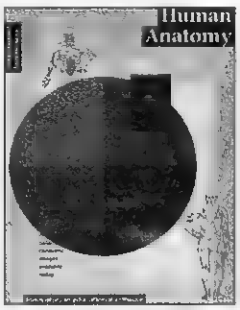
FlagTower

You are there—storming the beach at Normandy, watching Hitler rise to power, listening to historic radio broadcasts—in this interactive experience documenting the last world war.

[PC: WIN 3.1; 486dx; 8mb]

Vendor Price: $69.95

Borders Price: $27.95



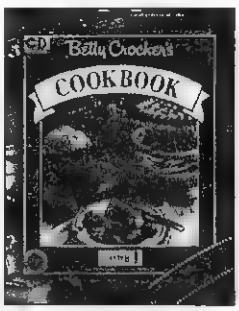
Gold Standard Multimedia

This educational simulator enables you to experience the dissection of a human body at your computer. References to printed atlases are included.

[PC: WIN 3.1; 486; 4mb]
[MAC: Sys 7.0; 68040; 8mb]
Hybrid: works on PC and MAC systems

Vendor Price: $99.95

Borders Price: $84.95



Lifestyle Software

Betty Crocker's cooking classic is served up on a CD containing over 1,000 kitchen-tested recipes and enhanced by dozens of how-to video clips.

[PC: WIN 3.1; 486; 8mb]

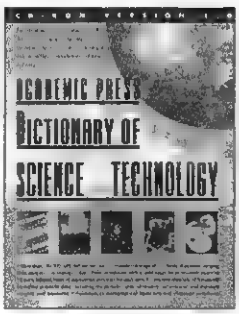
Vendor Price: $39.95

Borders Price: $29.95

[MAC: Sys 7.0; 68040; 8mb]

Vendor Price: $49.95

Borders Price: $34.95



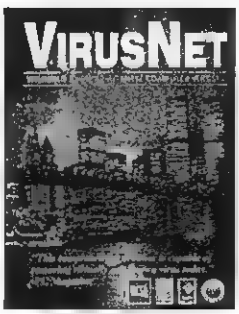
Academic Press

This comprehensive yet easy-to-use reference contains 130,000 entries covering 125 fields of science—everything from acoustics to zoology.

[PC: WIN 3.1; 386sx; 4mb]
[MAC: Sys 7.0; 68030; 4mb]
Hybrid: works on PC and MAC systems

Vendor Price: $79.95

Borders Price: $54.95



Just Softworks, Inc.

Protect your computer system from boot sector viruses, polymorphic viruses, Windows macro viruses and more with this powerful detection and removal program.

[PC: WIN 3.1, WIN 95, or OS/2; 386; 2mb]

Vendor Price: $69.95

Borders Price: $49.95

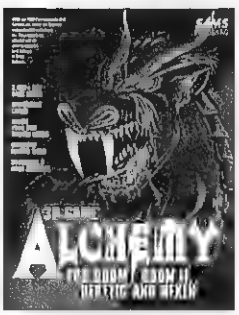
Sams Net

Master the programming language that enables you to add animations, sound and video to your Web page with this all-in-one tool kit and tutorial.

[PC: WIN 95; 486; 8mb]

Vendor Price: $69.95

Borders Price: $49.95



Sams Publishing

Create your own Doom, Doom II, Heretic and Hexen worlds with this programming kit that enables you to easily modify the gaming environment.

[PC: WIN 3.1, WIN 95, or WIN NT 3.5; 486; 8mb]

Vendor Price: $39.95

Borders Price: $34.95

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- Face your greatest fears in all of their 3D rendered terror!

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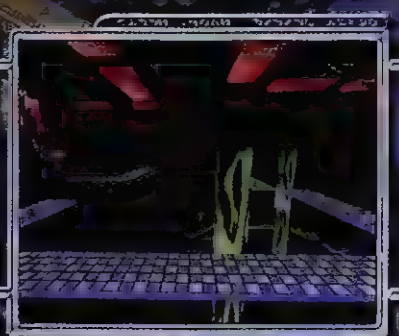

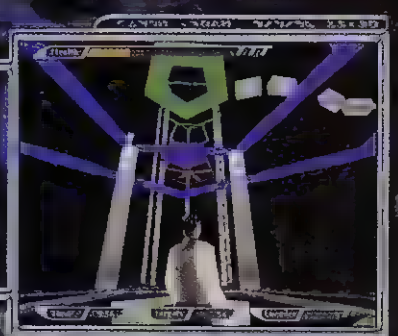

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Product Information Number 105

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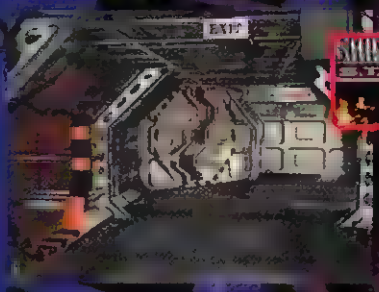
Games. A collection of full-operational and demo-version games.

This month's spotlight: networked/online multiplayer 3D worlds.

Quake

You get the phone call at 4 in the morning. "An enemy, code-named Quake, is using his own slipgates to insert death squads inside our bases to kill, steal, and kidnap. *Quake*, the long-awaited game from the people who created the original *Doom*, has two basic goals. First: Stay alive. Second: Get out of the place you're in. This demo contains the full first episode and all the lush graphics and gameplay that make the title destined to be a classic.



Shattered Steel

The year is 2132 and you're a mercenary with a Plane Runner, which can navigate most any terrain and packs the fire power of a light armored division. Your patrol is near the edge of known space and is plagued by frequent pirate raids. This demo contains the first five levels of the full game and puts you at the controls of the mighty mech.

Duke Nukem 3D

"Come get some," calls out our hero, Duke Nukem, as he sets out to take New Los Angeles' seedy underbelly back from alien marauders who have blown into town. At your disposal are shotguns, pipe bombs, shrink rays, grenade launchers, and more. Find jetpacks, Aqua-lungs, night-vision goggles, and other toys to help you beat down the baddies. This demo contains the devastating full first level.

WarBirds

Get online and get aerial with *WarBirds*, the flight sim that allows you to dogfight on the Internet. Install *WarBirds* on your computer and progress from a fledgling pilot to an experienced combat veteran. Best of all... With this software, you can fly *WarBirds* free of charge. Just start an account on the ICI Games host. Cancel your account anytime within the first five hours, and you will not be billed.

Strife

Strife is a unique 3D game that takes you into a world combining the fast-paced action of a shoot-'em-up with a riveting role-playing storyline. This demo gives you a taste of the full version, which features even more enemies, bigger badder weapons, and the rest of the gigantic *Strife* world to explore.

Apps. Demo and trial versions of cutting-edge technology.

Adobe Acrobat Reader 3.0 beta

Adobe has created a versatile PDF in *Acrobat*, and this beta of the version 3.0 reader will allow you to take advantage of all the latest features added to the format.

AnchorPage

Welcome to the world of automatic indexing. *AnchorPage* is an automatic indexer and abstractor, a program that analyzes your HTML documents, and finds and compiles significant phrases and concepts. These phrases and concepts are displayed in an abstract page, a concept page, and a phrase page, which are hyperlinked to each other and to your original documents. This version of *AnchorPage* is a limited demonstration copy. You may process up to 50K of source files.

Hijaak Morph

With this free application, from the people who brought you the graphics powerhouse *Hijaak*, you can create your own morphing movies. Simply select a starting image and a target image, assign reference points, and let *Hijaak Morph* generate digital magic.

Calamus

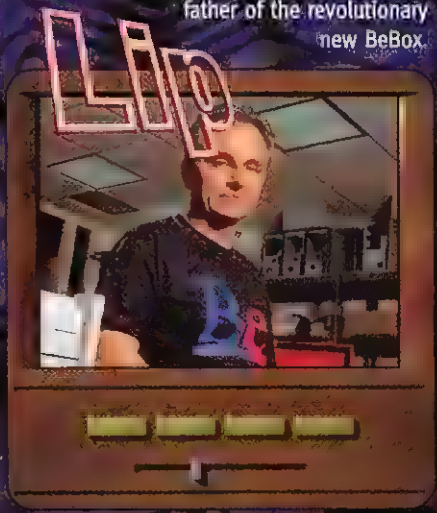
Calamus was designed to fulfill the need for a true 32-bit high-end desktop publishing application for the Windows 95/NT market. *Calamus* offers a new concept in design and function, providing greater creative and production control than other publishing systems. The open architecture of *Calamus* enables you to add and remove features as required, so new capabilities can be seamlessly incorporated as they are developed.

PolyForm

PolyForm easily creates 3D objects and converts 20 different 3D file formats. With *PolyForm*'s auto-tracing facilities, you can convert your BMP logos and art into 3D outlines. Then use *PolyForm*'s Logo Wizard to extrude and bevel your logo. View your object in a fully interactive viewer where you can move, rotate, and scale any object in any one of five rendering modes. And with the addition of advanced polygon optimization algorithms, visual 3D hierarchy dialogs, and full conversion of EPS files and fonts to 3D, *PolyForm* is *the* powerful tool for anyone interested in creating 3D objects.

features

Video interview highlights: Shoot a few questions at Jean-Louis Gassée, father of the revolutionary new BeBox.



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Product Information Number 98

Mark of the Beast

Hill and Knowlton's HomeAgain microchip, a rice-sized transponder, can be injected into the scruff of the neck of dogs and cats to provide permanent identification. Once injected, a handheld scanner can read the chip and identify a missing pet once it has been recovered by an AKC office. Since its introduction one year ago, the chip has assisted in the recovery of 620 stray animals in the United States. We're waiting for a remote tracker upgrade to enable on-the-fly searches for missing animals from family station wagons.

Duckman Cels Out

The outspoken and politically incorrect Duckman is currently hard at work on his upcoming *Duckman: The Legend of the Fall* CD-ROM, due for release in January. The feathered superstar from USA Network's late night series of the same name will star in the first-person, animated adventure. On the disc, you must solve puzzles as Duckman and outwit his ultimate nemesis, King Chicken. The title will feature 10,000 hand-rendered frames of animation and the voice of *Seinfeld*'s Jason Alexander.

What, no Doug Llewelyn?

The Court of Last Resort is the latest online offering from Sandbox Entertainment Network. The show is an interactive, virtual courtroom offering "Internet citizens the chance to seek justice without any overpaid lawyers, sequestered jurors, and exhausting legal processes." Chad Little, president of the Sandbox Entertainment Network says, "*The Court of Last Resort* is the World Wide Web's answer to *The People's Court*." Although the settlements are not legally binding, participants are compensated with prizes.

Online Diocese

The Internet has had a belated discovery in France, where until recently it was seen as a nerdy setup that only Americans could get really excited about. But French enthusiasm for the Net increased dramatically when events took a turn for the metaphysical and theological: A virtual diocese was created and a media hubbub has ensued.

It seems the pope was peeved with Jacques Gaillot, the Roman Catholic bishop of a diocese in Normandy. Bishop Guillot hadn't sinned, he hadn't professed a heresy, but he had committed a faux pas: He appeared on television a few too many times. The pope wasn't furious enough to excommunicate or demote Gaillot, nor could he make him a bishop-at-large—for a bishop must have a place in which to *be* a bishop.

So the church appointed him the Bishop of Partenia (location: more or less in the Algerian desert; population: zero), once a cutting-edge diocese in the fourth century, which by the sixth century was just a sand-covered notional site. Being the bishop of a diocese *sans* living Catholics prompted Gaillot to think in terms of the metaphysical, and *voila!* The first virtual diocese appeared online, allowing the bishop to be everywhere at once—something like God.

The site has become the rave of Paris cyber-cêperies (yes, it's what you think—a place where you can rent a computer and eat a crêpe).

And although you can't receive Communion or make your Confession (yet), you can go online to free yourself of high-caloric guilt (www.partenia.fr).

Planning for the Golden Years

Who needs action-packed games when there's *RetireReady!*, a dedicated retirement guide on CD-ROM. "This product is a wake-up call," says Diane Dietzler, vice president of sales and marketing for Individual Software, who points out that a baby boomer turns 50 every 90 seconds. The title, which lists for $49.95, performs such uplifting tasks as income analyses that help you develop a "realistic plan" for retirement. And, the What If utility lets you fantasize ideal retirement scenarios with imaginary finances.

The Price You Pay

For only $45 you could be the proud owner of a Rock-N-Road CD holder. This CD travel case, which holds as many as 12 discs, is made from recycled materials, such as license plates, street signs, and recycled truck tire inner tubes. Little Earth Productions touts it as "just as funky as the music it carries," and informs us that the Rock-N-Road CD holder also stores CD-ROMs.

Damn, I'm Looking Good

Imagine playing *Duke Nukem 3D* in a darkened pod, on a 33-inch high-res monitor, with an intercom for taunting through a six-channel surround sound system. It's a gamer's wet dream come true, and it's called The Otherside (TOS) Gaming Facility. Located in Seattle, Wash., the first TOS site just opened with *Duke, Descent II, ATF,* and *Warbirds* playing in the simulation pods. In addition to being a gaming arcade, TOS is also a retail outlet for gaming software and hardware products. The Seattle TOS is a prototype store. Similar facilities will open in different areas of the country "as rapidly as feasible," according to a TOS spokesperson.

Aeon Flux: The Game, The Movie, The Legend

The sexually charged, dangerous, yet fallible, superheroine Aeon Flux has both a video game and motion picture currently in production. The game, due out on the PC before Christmas, is a 3D beat-'em-up with some adventure elements. Players will control the MTV-owned heroine as she engages in first-person combat sequences and explores 3D mazes. The movie is still in preproduction, but currently scheduled to be a live action feature. According to Aeon Flux creator, Peter Chung, some major actresses have approached MTV about playing the part. We're picturing Emma Thompson in the role.

Virtual Cadaver Reincarnated

The Dissectable Human CD-ROM has been given a new lease on life by the international health science publisher Mosby, a subsidiary of The Times Mirror Co. To create the 3D database featured in this learning tool, the body of a legally executed male (a convicted murderer) was immersed in gelatin, very slowly frozen, and then sliced from head to toe into 1,800 sheets only one millimeter in thickness (kinda like pastrami). *The Dissectable Human* is now available for a suggested retail price of $49.95.

Let's do Lunch

Steven Spielberg officially enters the world of multimedia this fall when Knowledge Adventure releases his game, *Movie Maker.*

The game is a movie-making sim featuring Quentin Tarantino, Jennifer Aniston, and Penn and Teller. Spielberg himself is also featured in the title as your on-screen guide and mentor.

The object of the game is to direct a successful film, while managing budgets and schedules, as you attempt to make it onto Hollywood's "A-list" of directors. Once on the A-list, you can promote and distribute your work in person or over the Web. Players must overcome the same real-life problems Spielberg encountered behind the camera during shooting for the disc, such as delays in stunt production, stars being injured during fight sequences, and the incredible distractions of having Aniston on the set.

Smart Phones for Smart People

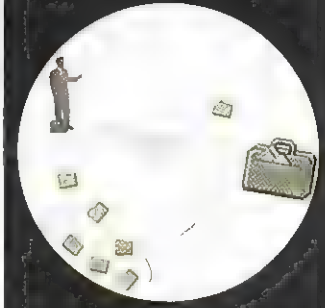
While so-called "smart" telephones offer a mind-bogging array of exciting new features, learning all of the somewhat complicated functions requires training and often ends up in potentially valuable calls being lost.

It's just plain annoying.

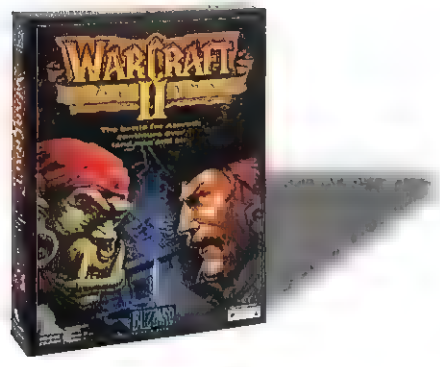
But the high-tech mavens who created this convenience of modern science have come up with an equally handy solution. Northern Telecom (Nortel) announced it is offering a $30 virtual reality training application on CD-ROM, so businesses can easily teach their employees how to use the many functions of its Meridian 1 telephone system.

Take My Files, Please

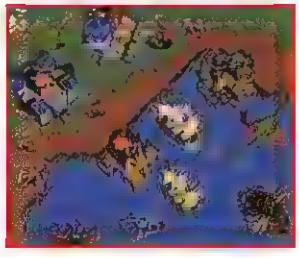
Would you grant an outside service total access to your company's files? Telebackup Systems, an "emerging" Canadian software developer is now offering a low cost, fully automatic, full-system, daily backup service called Wide Area Network (WAN, not to be confused with WAN). For just $15 to $20 per month per PC, WAN will read your files via modem and store them at the service provider's location. According to a recent press release, Telebackup "hopes to capture the position of market leader." With your files, and those of other companies, the task should be that much easier for the Canadian startup.



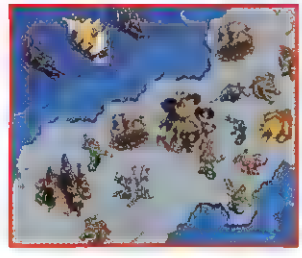
Game of the Year.



#1 Selling PC Game, Jan-April 1996 PC Data Report • **Game of the Year,** PC Gamer • **Multiplayer Game of the Year,** PC Gamer • **Golden Triad Award,** Computer Game Review • **Game of the Year,** Computer Gaming World Readers' Choice • **Best On-line Game,** C/NET


8 Players Head to Head

Battle over land, sea and air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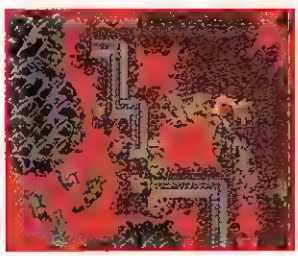

2 New Story Lines!

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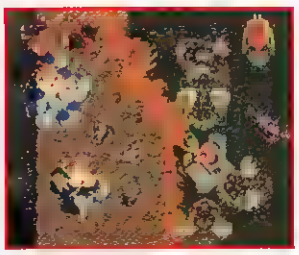

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Product Information Number 83

Gaming According to Gates

Microsoft Chairman and CEO Bill Gates explains exactly why the PC is the ultimate game platform

Microsoft is the big fish on the PC platform, and gaming is the big pond in the PC market. Why haven't they come together in a bigger way? We went to Microsoft to talk about how the company is increasing its focus on the gaming industry in three major ways. First, more than 50 percent of Microsoft-owned SoftImage's revenue now comes from sales of graphics software to game developers. Second, Windows 95 is being promoted as the best way to play games on a PC. Third, Microsoft is ramping up its game publishing division, from releasing just four titles in 1995 to a scheduled 10 in 1996, plus those in conjunction with their joint venture partner, DreamWorks SKG. Neil West and Chris Charla of boot's sister publication Next Generation visited with the supreme deity of operating systems and new player in the game market, Bill Gates, about these developments.

boot: Given the success of *Flight Simulator*, and the boom of the PC game industry, why hasn't Microsoft put its full weight behind an assault on the gaming world before?

Bill: We saw the embarrassment of how hard it was to install games, and the conflicts between DOS games and productivity applications after we shipped Windows 3.1. And we saw it as holding back the home computer market. You really shouldn't have to have an expert friend to dig into your configuration file. And games were part of that. So part of [our goal] was making the PC a more stable platform, having the games not destabilize the other things you were doing.

boot: Of course, many of Microsoft's other projects have significance for the game market...

Bill: The commitment to do the world's best graphics architecture started about three years ago, but these things take time so we brought in the really smart people, and some of the super-advanced elements of this you won't see in the market for a couple of years. Then we'll be able to say, "Hey, we think we're way beyond even the most expensive Silicon Graphics workstation you can buy today, and at PC price-points."

boot: Microsoft is increasing its focus on the gaming industry. Is this merely a few divisions of a large company unilaterally moving to the gaming sector, or is this part of a larger company objective?

Bill: Well, hopefully it's a larger company objective [laughs]. You know, the use of the PC in the home environment is increasing and gaming is a big part of that. People love to play games, and most of the things you do to make games better are things that apply to other software as well. I mean, enabling the audio to work well and the graphics to be fast. Games are a great way to measure progress there, because game writers are just super demanding, and they've basically ignored Windows. Up until Windows 95, the way you wrote a game was you wrote around the operating system. Even Microsoft's own *Flight Simulator* was a DOS product, and it's only now that we're building the Windows version of that. And it was all just about speed. That whole notion of, "Do our graphics layers give flexibility, or do they just slow things down?" Well, there's no harder-core audience than the gaming community to go out and ask, "What does it take?" It always causes problems if you go around the operating system. I mean, like installing DOS games a couple of years ago, where you had a different audio card, or you sometimes used Windows, but you'd like to run games that didn't work under Windows. It was a nightmare.

> "... people always told me that Windows would never succeed because character mode was faster, and characters would always scroll faster, and people could just go to the frame-buffer faster than they could write through Windows. Well, today, you don't—except in the game world, and that's now changing."

And we're just working our way out of that. With the broad popularity of Windows 95 and the support from the gaming guys and the hardware guys, you know, we're finally to the point where a person can say, "Yeah, you don't have to know somebody who's an expert to do these things."

boot: And Windows 95 has really been the focal point for all this effort, by providing an easy-to-use "Plug-and-Play" environment?

Bill: Games don't use the file system very much. So basically, until Windows 95, games were written to the hardware. Now, with the variety of audio cards and graphics cards that are out there, it was becoming as much of a nightmare for the developers—testing and installing—as printer drivers were for productivity applications before, say, a decade ago when we finally started to

While he makes no bones about the unattractive complexities that plagued DOS, Bill Gates is confident that Win 95 will facilitate the PC's dominance in gaming.

get those into the operating systems.

Nobody today thinks, "Oh, I'll write a unique print driver." That's Microsoft's problem to work with the printer guys to get all of those drivers done.

And so we said, "Hey, we're going to make Windows 95 attractive for game developers, so they'll stop writing DOS applications." I'm sure some people here were skeptical about ever getting those guys to stop going around it. Well, part of our breakthrough was that it turns out that—because the blitters all worked a little bit differently—PC hardware actually has some acceleration capabilities that the DOS people weren't using. But by abstracting those blitters out, we actually gave people a layer where they often would run faster than they had with DOS. And this started to open peoples' minds.

boot: Direct3D, in theory, provides the illusion of a standardized 3D graphics acceleration specification. Because of the slight overhead of the Direct3D APIs and drivers, when one writes directly to the hardware and bypasses Windows 95, there will always be a marginal speed boost. Since marginal increases are often what separates a killer app (*Doom*, *Sonic*) from the also-rans, isn't there a danger that game developers will still bypass Direct3D, and hence Microsoft's software, in pursuit of a competitive advantage?

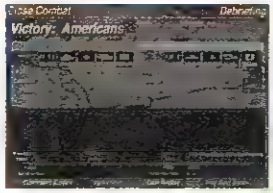
Bill: No. Three percent performance gains do not make the difference between a killer application and...

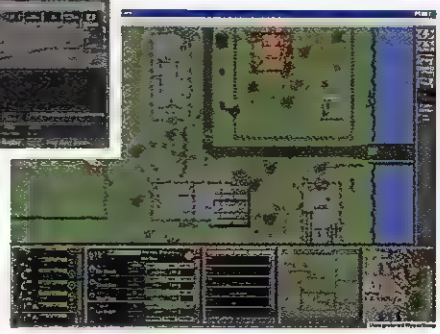
boot: You're sure that Windows 95 will only suck a 3 percent loss?

Bill: Our job is to make sure that 3 percent is all it is. The thing that you're spending time on is drawing the polygons or filling in the textures, and for this the API is thin to the accelerated hardware, and you're not going through it again and again. If we find a case where somebody wants to go to the hardware [thus bypassing Windows 95], if they're really going for that extra 3 percent, we'll tell them they're crazy because it'll make their job a nightmare. They'll never be able to keep up with it. But if [the advantage of bypassing Windows 95] is more than 3 percent, then we need to make sure our API gets richer.

So no, I don't see a problem with that. I mean, people always told me that Windows would never succeed because character mode was faster, and characters would always scroll faster, and people could just go to the frame buffer faster than they could write through Windows. Well, today, you don't—except in the game world, and that's now changing. The speed differences in absolutes got small enough that the benefits were very, very strong.

And there are benefits to being able to receive a fax in the background, or being able to just hit a button and go over and look at something else. I mean, our vision of your computer is that you basically never turn it off. And if you want to look up a movie review on the Internet, or if you want to see about spending money, or see if messages have come in, it's got to be there all the time. This boot-time thing is just ridiculous.





Close Combat, a real-time strategy game, is one of 10 titles coming from Microsoft this year.

In addition to the 10 games to be released this year on the Microsoft label, a series of titles made in conjunction with their joint venture, DreamWorks SKG, is due this holiday season.

boot: To what extent should console-based gaming's current major players fear Microsoft's arrival?

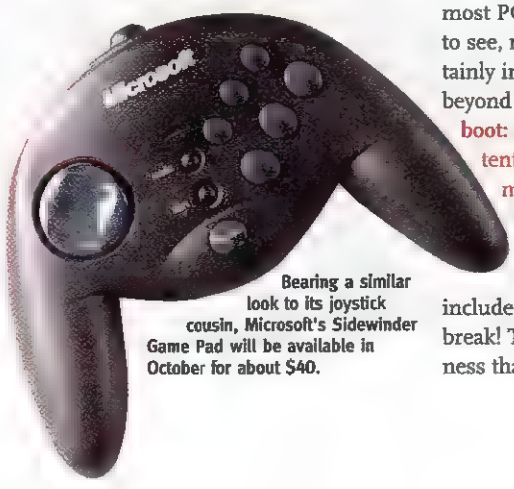
Bill: [Smiles] Well, not really. Usually, if you want a PC and the kind of richness and general purpose things that it provides (you know, bring your work home, write your homework, all that), then you generally know before you walk into the store that you want that. It's possible that when you buy a PC, then you say, "Hey, now I don't need to buy a game platform, I'll just do everything on my PC."

So even though the PC is more expensive and even though it'll edge down to the $700 to $800 range over the next two or three years, it is a very, very different price point to $200. But when you buy games, you'll be able to find low-cost games in the $20 to $30 range for our platform.

So, yes, in a sense we're in competition. I mean, if we're promising to make graphics on the PC better than on a Silicon Graphics workstation, we sure as heck are going to make them better than on a $200 game device. We've lagged behind [Sony's PlayStation handles texturing better than most PCs], but the PCs you're going to start to see, maybe six months from now—certainly in the next 12 months—will be way beyond that.

boot: Do you currently see stronger content on the PC or on the game machines?

Bill: Well, I think boxing games are better on the dedicated consoles. But if you get really broad and include *Myst*-like games, I mean, give me a break! There you need the storage and richness that comes with a PC. b



Bearing a similar look to its joystick cousin, Microsoft's Sidewinder Game Pad will be available in October for about $40.

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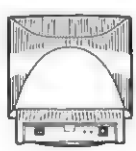

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MMX Means Faster Multimedia

Intel delivers matrix multiplication, fast Fourier transforms, discrete cosign transforms, and phoneme matching

If Intel's x86 microprocessor architecture were a person, it would be old enough to vote for president this fall. (Though given the available options, it would probably choose to stay home.) Instead, the x86 will celebrate its 18th birthday by giving PC users a gift: better multimedia performance.

Intel is adding 57 new instructions specifically designed to speed up multimedia graphics and sound on x86-based machines. Programs taking advantage of these instructions will run noticeably faster and more efficiently. The new capability is called MMX (which used to stand for "multimedia extensions" but is now, according to Intel, just a brand name).

MMX will first show up in a Pentium code-named the P55C. This processor will likely run at 200MHz and incorporate other improvements, such as larger on-chip caches. But MMX is the real news. It's the most important revision to the x86 since Intel stretched the architecture from 16 to 32 bits in 1985.

Eventually, all x86 chips will offer MMX, including x86-compatible chips from Intel's competitors. MMX is supported by Advanced Micro Devices (AMD), NexGen (which is owned by AMD), Cyrix (which is adding MMX to its new M2 processor), and IBM (which licenses its x86 designs from Cyrix). All plan to introduce MMX-compatible processors late this year or in 1997. Intel is adding MMX to the Pentium Pro next year as well.

Unfortunately, existing software won't benefit from MMX. Developers must either revise their current programs to use the new instructions or build MMX into their new products. Fortunately, since Intel released the technical information to software developers months ago, the first MMX-compatible software will appear when the P55C debuts before year's end.

Intel is trying to accelerate the adoption of MMX by integrating it into the x86 architecture as painlessly as possible. This isn't easy with a standard dating back to 1978. For example, when Intel introduced the first 386 in 1985, the 32-bit revisions were so extensive that few software developers took advantage of them. Only now, 11 years later, are PC users migrating to 32-bit operating systems such as Windows 95 and Windows NT. Most of the PC software in circulation is still 16-bit.

To keep the same thing from happening this time, Intel made a few technical compromises. For example, MMX adds eight new processor registers for the exclusive use of its own instructions. Except they aren't really new registers at all—they're mapped into the existing stack of floating-point registers so cleverly that existing software can't tell the difference. Upside: Current operating systems don't have to be modified to manage the new registers. Downside: If programmers carelessly mix floating-point and MMX instructions in the same code sequence, performance could actually get worse.

Although MMX instructions borrow the floating-point registers, they're all integer operations. That's OK, because multimedia processing is typically integer intensive. The operations that MMX will speed up include MPEG video compression, wavelet compression, motion estimation, motion compensation, color space conversion, texture mapping, 2D filtering, matrix multiplication, fast Fourier transforms, discrete cosign transforms, and phoneme matching. That covers a wide range of audio and video needs common in processor-intensive games and multimedia software.

For instance, consider a fast-paced game that runs in 8-bit color mode. Today's x86 processors can only animate one pixel at a time. MMX includes new instructions that can shuffle eight pixels simultaneously. And MMX does not threaten backward compatibility: If an MMX program is running on a non-MMX processor, it can revert back to the regular x86 instructions.

Multimedia PCs equipped with MMX chips will cost about the same as their non-MMX counterparts do today. In other words, if you are buying a new system in the near future, make sure to get the MMX chip and you'll get the extra performance for free. That's a birthday present worth celebrating.

— Tom R. Halfhill

Next Stop: Merced

Next generation processor poised to cut short the life of the Pentium Pro

The Pentium Pro's successor, code-named Merced, is currently being sampled to OEMs and is expected to be introduced in the final months of 1997. Intel is not revealing any specific information about Merced or any other P7 processors, but three variations of the chip are reportedly in the works.

Intel's Merced is a 64-bit processor that is expected to be twice as fast as the 200MHz Pentium Pro and able to run 16-bit and 32-bit x86 code. Merced will incorporate the MMX instruction set for enhanced MPEG, audio, graphics, telephony, and video conferencing capabilities, according to Mike Shuster of Intel.

According to reports published on the Web, the second P7 processor is a derivative of Merced designed by Hewlett-Packard. It includes a PA-RISC instruction set optimized to run HP's upcoming 64-bit Unix OS. The third variation of Merced is being codesigned by HP and Intel. This P7, code-named Tahoe, is due to appear in 1998 for a 64-bit Windows OS.

Intel has already cut the price on its Pentium Pro processors up to 50 percent in an effort to move existing stock and recover R&D and production costs. Another price reduction is expected this fall. As a result, consumers are likely to see the price of Pentium Pro desktops, currently retailing at around $5,000, to drop dramatically in the coming months.

— D.L.

DVD: Turn of the Century Technology

Don't throw your CD-ROM drive away just yet

The first DVD-ROM drives and movie players are set to start shipping by the end of this year. But before you wait for a DVD-ROM drive to arrive instead of picking up a new 8x CD-ROM drive, be warned: Software for DVD is not likely to arrive until late next year. If then.

There are two reasons for the lag between the arrival of DVD hardware and software. First, there is no technology solution for copyright protection in place, at the time of this writing. DVD's increased storage capacity allows it to hold digital video and audio, which cost more money to produce and, subsequently, increase publishers' desire to protect their work from piracy. The second reason is a lack of enthusiasm for DVD among many of the major software developers. A spokesperson for a top-10 entertainment software developer, who wishes to remain anonymous, described his company's feelings about DVD as "apathetic."

The top reasons for this malaise cited by the spokesperson are the lack of a final spec on the DVD standard and that hardware manufacturers have not made working prototypes available to developers for testing. In addition, other than reference titles, which do not drive the market, many developers feel DVD's increased storage capacity is not needed for anything beyond video, which historically has done nothing for gaming. Most top-selling games, such as *Duke Nukem 3D* (98.9MB) and *Mech-Warrior 2* (122MB), don't come close to filling a 650MB CD-ROM.

Given the typical 18-month period to produce a game once the final spec is announced, even the companies who have voiced support for DVD, such as Activision, Softkey, and Creative Multimedia, are not likely to release a new DVD title with original content in time for Christmas 1997 or 1998. Developers with multiple-disc titles in their catalog, such as Activision (which is planning to release DVD versions of *Spycraft* and *Zork Nemesis*), may be able to repurpose their games for DVD in 1996, but it's unlikely that reruns will create a demand for DVD-ROM drives.

"People will go out and buy DVD for one title," says Peter Nicholas Biddle, technical evangelist in Microsoft's platform group. Biddle agrees, however, that the so-called "killer app" must be an original that, in one way or another, takes advantage of DVD's advanced capabilities: the data transfer rate (4.69 Mbits/sec versus the 0.9 Mbits/sec of a 6x CD-ROM drive), AC3 audio (six-channel digital audio), or MPEG2 (broadcast quality video), and, of course, the vastly increased storage (4.7GB) capacity.

Meanwhile, hardware manufacturers have different theories about when DVD will be embraced by consumers. Toshiba, Compaq, IBM, and Hewlett-Packard have all announced plans to ship DVD-ROM drives, either as stand-alone devices or in their new lines of systems, before the end of this year. "We see it in our ultimate multimedia machine for this Christmas," says Laurie Frick, vice president of emerging markets at Compaq. "Then, in late 1997, it will be in all of our high-end systems." Panasonic, Philips, Sony, and others expect to ship DVD-ROM drives by year's end, but none see DVD as a viable medium in the near future. "There are issues," says Steve Feldstein, director of marketing and communications for DVD at Philips. "In terms of ROM development, it's a '97 product." Sources at Panasonic say they see DVD's mass arrival coming in 1998.

On the movie player side, DVD seems poised for holiday success. In June, a copyright protection solution was agreed upon by the Motion Picture Association of America (MPAA) and Consumer Electronic Manufacturers Association (CEMA). Time Warner, which has been working with Toshiba on DVD from the start, has announced that it will release more than 100 movie titles on DVD movie discs before Christmas.

As was the case with CD-ROM, the emergence of the DVD-ROM format will take time, but DVD is expected to be a mass market item until the end of the century. Those craving the leading edge will take the leap to DVD and endure the growing pains. Those seeking a stable technology should stick to CD-ROM—which has only recently matured into a manageable and affordable medium—for at least another year, maybe two.

— Doug Lombardi

MB for MB: The Top-Selling Titles

The megabyte tally of today's top-selling titles makes a strong argument against the immediate need for DVD's 4.7GB storage capacity.

WarCraft II: Tides of Darkness **132MB**

Civilization 2 **357MB**

Myst **253MB**

Descent II **335MB**

Microsoft Flight Simulator **20.3MB**

Source: PC Data (June 1996)

A spokesperson for a top-10 entertainment software developer... described his company's feelings about DVD as "apathetic."

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PC Magazine

Product Information Number 119

I AM MYSTIFIED

TODAY'S **TWIDDLEWARE** LEAVES ME **FLAT.** WHATEVER HAPPENED TO THE **LEATHER GODDESSES** OF PHOBOS **ANYWAY**?

I hate *Myst*.

At times I consider this a failing. Everyone speaks so breathlessly about how much they *loved* it, how they were transported by it. They compare it to classic literature such as Lewis Carroll's *Alice* books or the fantasies of J.R.R. Tolkien. They go on and on about playing all night. Listening to this, I feel I must be some joyless troll who insists upon missing the point. Have I lost my childlike sense of wonder?

Then I boot the damn thing up, play for a few minutes, and say... naaaah.

I come from the old school. My first experiences with PC games were early Infocom titles such as *Hitchhikers' Guide to the Galaxy, Leather Goddesses of Phobos,* and, of course, *Zork*. These games were full of true wonder and imagination, or at least they seemed that way to our entertainment-starved brains. You'd type commands like "`go west, open door`," and follow the text that streamed out in response. It was like a book unfolding at your fingertips. It was entertaining, it was imaginative, and I haven't played one in years.

Why? Gaming moved on, and I followed. I found *Railroad Tycoon* and *Eye of the Beholder* and *Civilization* and *Doom:* games that made the text parser of yesterday look about as practical as trying to freeway commute in a horse and buggy. They opened up entirely new possibilities. You see, at the time, computer users had to be familiar with the working of the machines. Game designs could be complex, with countless prompts, icons, and commands. Designers weren't afraid of the gamer.

The PC user of today is most likely someone with only a passing familiarity of their computer. As the market expands, the knowledge level of the average computer buyer drops. They're good with point-and-click interfaces, but the notion of editing a CONFIG.SYS file would send them screaming into the night. Therefore it is assumed the complex inventory management system of an RPG or the detailed fiscal elements of *Railroad Tycoon* would intimidate them.

So, the logic goes, the game industry must create a game with no inventory, no complex elements, no pain. Looks are more important than substance. It has to be non-threatening. It has to be friendly and new-agey. Just try; you can't really fail. And you certainly can't die. It's the *Myst* formula, and, if sales are any indication, it is the most popular form of computer entertainment ever.

Looks are more important than substance. It has to be non-threatening. It has to be friendly and new-agey. Just try; you can't really fail. And you certainly can't die.

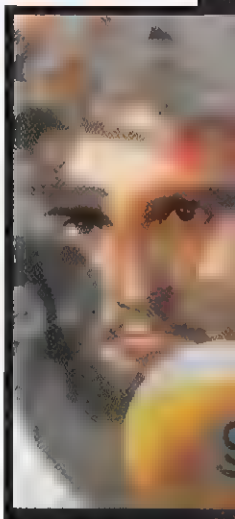
I won't begrudge *Myst* creators Rand and Robyn Miller their mammoth success, and not just because they now have enough money to buy their own Middle Eastern country and order a fatwa against infidel game reviewers. God bless 'em. They made what the people wanted and gave many great pleasure. Would we all live so long and perform such feats.

But to the die-hard PC gamer, *Myst* was a Pandora's Box. It unleashed an entirely new style of game design, and countless imitators rushed to cash in. *Myst* and its kin are essentially slide shows with hot spots. Artists render numerous camera angles of an environment. You click through these images as though navigating a real world. At certain points, these shots are minimally animated with overlaid video clips. At others, they're "hot," or interactive.

Besides *Myst,* Macromedia *Director* has made all of this possible. Director is powerful presentation software that can combine bitmaps, video files, and minor interactive sequences into the form of a game. Some developers cross fade bitmaps in an attempt to create a more fluid movement, but the result is not nearly the same as in a true 3D computer environment such as *Doom* or *MechWarrior 2*.

The resulting Director-based game is, at best, only minimally interactive. The best you can get is "twiddleware," a game in which you can mess around with dials, levers, blocks, and buttons to reach the next image or sequence of images. Interaction is limited to clicking in the proper sequence. Period. That's all she wrote. These are computerized Rubik's Cubes, and they are stultifyingly boring and fatally uninventive.

And they're everywhere. *The Martian Chronicles, Queensrÿche Promised Land, Zeddas, The Last Dynasty, Robot City, Total Distortion, Gadget, Hell Cab.* Do I need to go on?



These are the Sons of *Myst:* the mutant, bastard offspring of a fiscally successful game. They are the interactive equivalent of a *Die Hard* rip-off in the movies (i.e., *Under Siege, Sudden Death, Passenger 57*): titles pumped out to cash in on a proven formula. Knock off games like this can be created in a fraction of the time (and with fewer people, and at less cost) than a fully rendered, free range-of-motion environment such as *Terra Nova* or *Duke Nukem 3D*. Their high-res bitmaps are alluring on the surface, but as hollow inside as a chocolate Easter bunny. To gamers weaned on expansive, inventive games that let you explore at will, use their minds, wage wars, and build empires, this format is anathema.

I can think of only one successful title that used this format, and that is *The Dark Eye*. As expected, The *Dark Eye* fails utterly as a game, since it is only marginally interactive. But it succeeds, through a dazzling combination of imagery, ▶ 120

T. LIAM MCDONALD is the all-knowing god of gaming. He also writes about computers, literature, and horror for numerous mags.

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GIVE ME BANDWIDTH!

ISDN OR CABLE MODEM, $ OR VAPOR... THAT IS THE REAL QUESTION.

Power user. They call me a power user. I'm online constantly, developing hard-core, heavy multimedia content for the Web or uploading multiple, mega-huge files to a server. Heavy and huge being the operative words here. When I'm slaving for *The Net* magazine, no problem, I've got a T1 plugged into my brain. But when I'm at home, my poor little 28.8 clogs up with Shockwave files and QuickTime VR. Spit. Gurgle. Connection timed-out! If you figure the standard 28.8 takes about 1 second to download 1k, those 400k of multimedia decadence will consume a whopping 6.666 minutes to transfer.

And that's ONE file. Ouch.

So, in searching for home-style bandwidth solutions, what's a girl to do? ISDN or cable?

ISDN (Integrated Services Digital Network) has been hot hot HOT in Europe for the past five years. And it's just now catching fire in the states. During the last year, companies such as Supra, US Robotics, and 3Com have released ISDN modems to support the various online and Internet service providers (MSN, EarthLink, CompuServe, and Netcom to name a few) who offer ISDN access.

Most ISDN modems are switchable between analog 28.8 access and the high speed up to 128Kbps infrastructure of ISDN access, and some can even switch to accommodate standard analog voice lines without disrupting your connection. But the modem will cost you anywhere from $300 to $1,000 depending on which features it supports.

Hmm, modem or rent? That's a tough one.

But don't think you're done with the bills yet. There's a healthy fee for installing this line of wonder. To get ISDN wired to your house, expect somewhere in the neighborhood of $150 in setup fees alone, before any additional usage charges. Home ISDN (Single Line Residential ISDN) from PacBell costs $125 for a one-time ISDN installation, plus $34.75 for a one-time line installation, plus a line charge of $24.50 per month, in addition to—here's the kicker—usage charges. Though PacBell will gladly waive the installation fee if you'll sign a contract that says you'll use their service for at least two years. Forced loyalty, you gotta love it.

Cable modems (see Pure Lust, page 35), will be provided by local cable companies and service will run around $30 per month for unlimited access, which is considerably cheaper than its ISDN counterpart (a fact you already know if you added up all the numbers above). While all the rage in a small corner of northern California—where the mighty citizen Hearst family has teamed up with TCI to run @Home, a prototype cable modem service—cable modems do look very promising... though the current distribution scheme is a little shaky. OK, distribution is very shaky. Less than 50 people had one of these little darlings in June, though the company promises they will someday be well distributed and transfer your bits really really fast. Did I mention fast? Imagine 28MB per second. You could split the bandwidth between everyone in your house (including the dog), watch cable television at the same time, and still outrun the expensive ISDN line your neighbor's shelling out the big bucks for. While some weak-willed individuals insist on whining about "poorly installed and manufactured cable lines that need to be upgraded," with money like Hearst, TCI and Visa backing it up, I think they'll be able to hire a few extra technicians to get the job done. And, with the deregulation of the telecom industry and the Communications Decency Act (grrrr!), any other roadblocks that prevented the cable industry from seizing the market have vanished into thin air—just like our freedom of online speech!

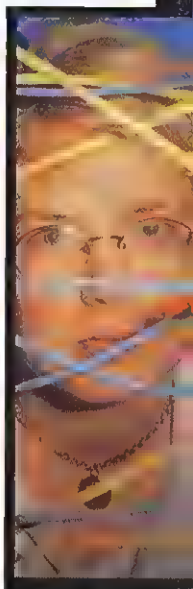
And while we've got Real Audio (on demand), do you really think it will be long before we get RealVideo on demand? RealGaming on demand? RealSex on demand?

So, assuming @Home pulls off the grand experiment successfully, the next logical question is: Why would your typical everyday user even want faster access? Look alive! Just because you ain't building Shockwave files for some prestigious Web design firm (yet) doesn't mean you're not going to have to download some of this hoo-haa from your friendly neighborhood site. And while we've got Real Audio (on demand), do you really think it will be long before we get RealVideo on demand? RealGaming on demand? RealSex on demand? As more and more of us site developers drop bigger, better, and prettier bandwidth-hogging files into cyberspace, more and more casual surfers will have to upgrade to see the monuments we've created.

@Home has built its entire service around the elusive cable modem. With intense inline video, voluptuous VRML, Shockwave up the wazoo and graphics to shame any other online creation, @Home is planning to swallow the bandwidth issue in one gulp. They aren't worrying about the small fry, low-bandwidth, text-based cyber surfers, and don't really seem to care about anyone who's not using Netscape. The only glitch is that to support the speed a cable modem can offer, and really optimize its potential, you're gonna need a monster system with mega RAM and improved chip architecture. (That liquid-cooled Alpha laptop at Digital is probably looking pretty nice now.) Which means, even though cable access to the online world of the future will be affordable, the system needed to get in the door might not be.

So back to the all-important question, cable or ISDN?

A better question is: Anyone out there building a better compression tool?



SHEL KIMEN (shel@thenet-usa.com) Web Director for the Net magazine, http://www.thenet-usa.com, has spent more time online than is reasonably healthy for one person and dreams in hypertext.

TIE ME UP, TIE ME DOWN

WE HAVE **LEGS**. WE WALK. WE GO FROM **ROOM** TO ROOM, FROM HOME **TO WORK**, FROM **CITY TO CITY**.

Using a desktop system is like lugging the proverbial ball and chain. If I wanted that, I would have married when I was 18.

When a desktop is your primary system, you're stuck. You must move to the information. And stay. Need to open a file, write a letter, create a presentation, print a chart, check your e-mail? Ya gotta go back to your desktop. But we humans are mobile beings. We have legs. We walk. We go from room to room, from home to work, from city to city. The metaphor of the fixed position desktop just doesn't suit us. Doesn't it make so much more sense to have a portable system—a PC that goes where you go?

When I'm at work, I'm tethered by a three-foot keyboard cord that won't even allow me to peek my head out of my cubicle. Worse, my keyboard doesn't travel to editorial meetings—which is a real pain in the butt because my typing is a heckuva lot faster and more accurate than my handwriting. (And, of course, everyone asks arcane questions about some deadline five months from now or the status of an invoice submitted two years ago. But that knowledge is trapped back on my desktop. What I need is a laptop with an IR port so I can shoot a little red beam across the office, bounce it off a wall or two, and get the requested information from the network server sent to me in the meeting room.)

Am I whining? Yeah. But with good reason.

There are days when I really do need more soothing aesthetics. I like our modern offices enough, but when the fine, fine weather is screaming at me to come out and play, I'd rather have some sort of compromise position. (I conserve my more creative excuses for my editor in chief as to why I have to bolt over to Candlestick Park and watch a ballgame and eat hot dogs in the middle of a workday.) When the sounds of a hectic newsroom prove too challenging for my concentration, I would love to just walk downstairs, set myself down on some patio furniture and work in the Jurassic Park atrium of our office building. Except my keyboard cord doesn't stretch that far. I'd love to work on a 12.1-inch crystal-clear active matrix screen under the blue sky peering through the open-air roof, head back upstairs when I'm good and ready, and synchronize and transfer files from my laptop to my desktop using some handy program like *LapLink*.

And the times when I'm not in the office, such as when I'm traveling (or as I prefer to call it: the world of waiting), too many hours are lost staring blankly out the window of the commuter train or in an airline terminal, waiting to board yet another flight (delayed, again), when I could have been more productive. Like making production schedules, or writing assignment letters, or editing stories (or playing *Duke Nukem 3D*... research purposes only, right?). Except all those schedules, form letters and stories (and digital shotguns) are stored on my desktop.

> Humans are mobile beings. Doesn't it make sense to have a portable system—a PC that goes where you go?

Then there was the time I was headed back from a trade show where I scored an exclusive story. My ETA was 1 o'clock. My deadline was 5 o'clock. Not much time to grab my luggage and catch a cab to the office, but enough. I wrote the story by hand in the terminal in 30 minutes flat. I could quickly key it in back at the office. Once in the air, I stared and stared at my watch. I tapped my foot on the floor, wrapped my knuckles on the pull-down tray, and played miniature hockey using the airline honey roasted peanuts. I looked out the window to discover we were shrouded in a dense gray fog, and just then the pilot mumbled something over the PA. The only discernible word was, "Delayed."

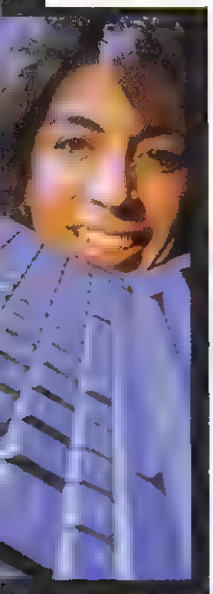
I'm ticked off. Won't make the deadline. No exclusive.

As I banged my head against the seat in front of me, I noticed the in-flight phone. I could call the office and have a colleague transcribe my notes. I tried and got stuck in voicemail hell; would've left a number but what do I tell them, "Call seat 14B on United flight 1567?" As I hung up, I noticed the phone had a fax/modem jack. And then I was really ticked off. It would have been great to transfer my notes, write and file the story from seat 14B somewhere over the Midwest. Except my desktop keyboard didn't stretch that far. That's when I really needed a laptop with an internal modem or a PC card plug-in. Better yet, a cellular modem with a GTE wireless connection (just in case I'm sitting next to a super salesperson that has to hog the in-flight phone to schmooze clients from 30,000 feet).

So after I got over losing the exclusive, I bought that laptop to give me some room to roam. I have everything I need from the desktop wrapped up in a "to-go" box. It's so refreshing and easy to switch my modular 4x CD-ROM drive with my 3.5-inch floppy, connect a printer, and slap in a variety of PC cards (modem, network connection, flash memory, etc.), unlike the acrobatics of connecting peripherals on a desktop where I have to climb over, under and around my system just to find the right port. I gave up banging heads, bruised body parts, cuts, scratches and general agility when I retired from competitive sports. I'd rather just watch these days.

Which brings me to a happy conclusion. It's the bottom of the ninth at Candlestick. Had my hot dog, Cracker Jacks and Coke. The Dodgers are ahead by five runs, and the bottom of the Giants order is due up. This one's over. Might as well pack up my Gateway 2000 Solo Pentium and make the five-minute trek back to the office before the 4 o'clock status meeting. b

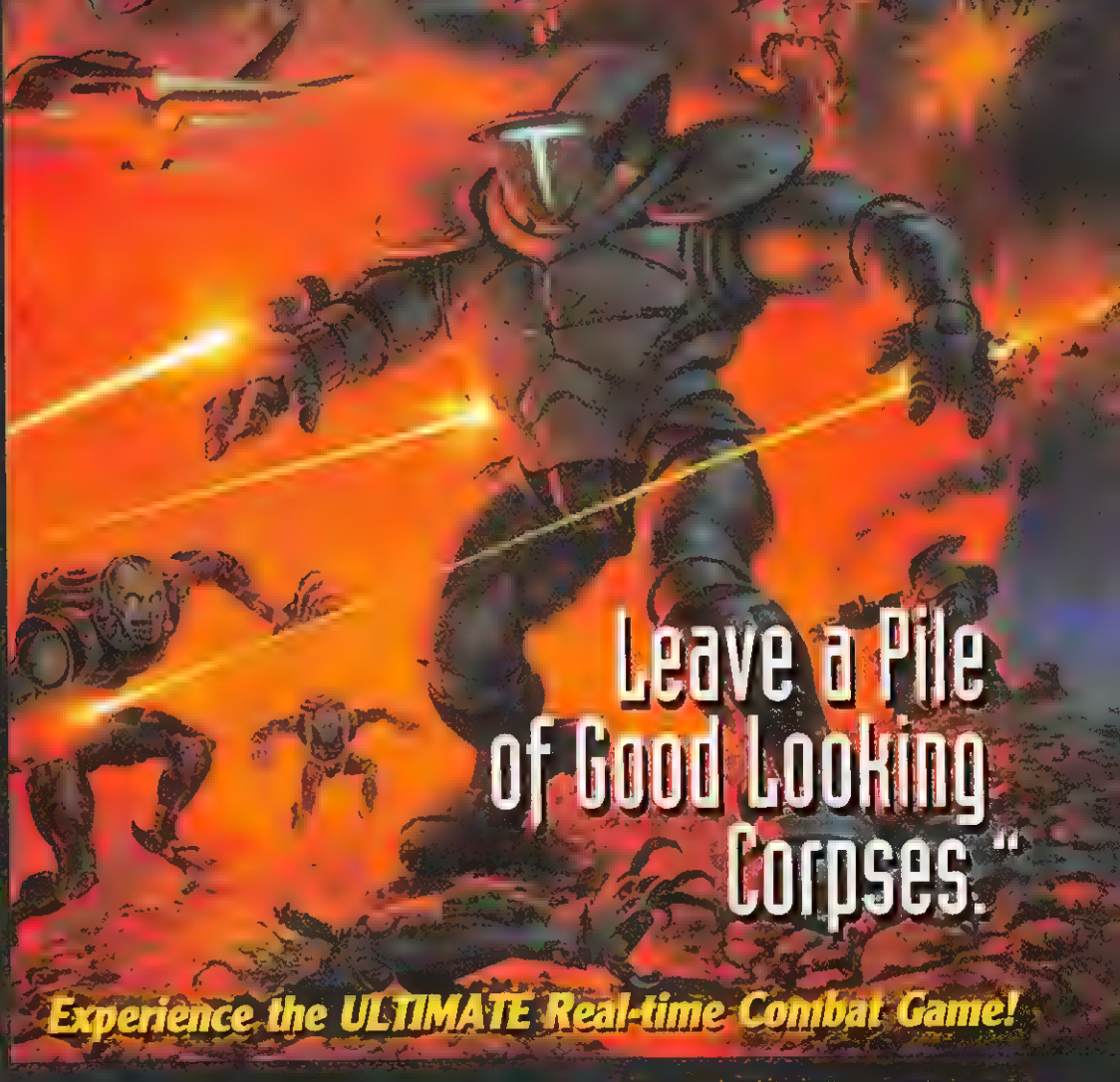
ANGELA LoSASSO is *boot*'s managing editor and a mobile maniac



"Live Fast, Die Young . . .

TERRA NOVA

STRIKE FORCE CENTAURI



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puredust

HIGH-TECH **TOYS** AND **TOOLS** WITH THE RIGHT STUFF

Hang it up

Sony is preparing to ship the first TV you can hang on the wall. While notebook manufacturers trade bragging rights about the 12-inch screens on their high-end models, Sony's Plasmatron displays are as large as 50 inches.

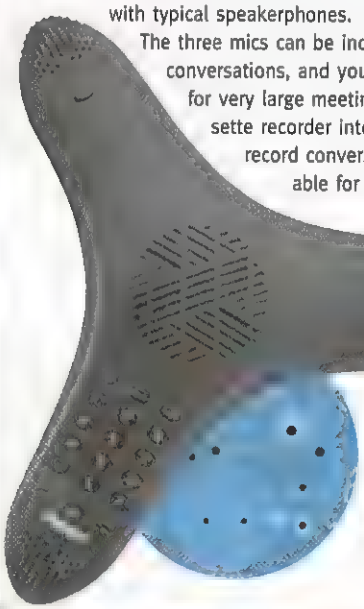
The Plasmatron features Plasma Addressed Liquid Crystal (PALC) technology developed in conjunction with U.S.-based Tektronix. The PALC display is an active matrix system that separately addresses each pixel of the liquid crystal to produce sharp contrast and smooth display of moving images—a feature sorely lacking in laptops. Unfortunately, the Plasmatron won't be available in the United States until at least next year.

Sony; 800.222.7669; www.sony.com

Gather 'round the table

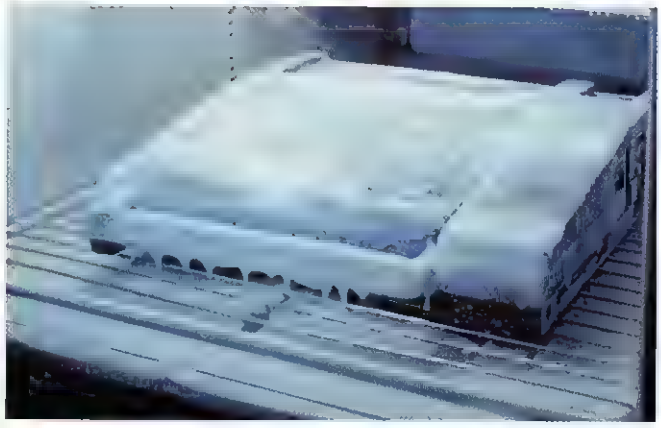
U.S. Robotics' Conference Link CS1000 speakerphone features three microphones built into a propeller-shaped enclosure to offer 360 degrees of coverage—excellent for use in any size room. Its full-duplex operation allows you to speak and listen to the other party at the same time, eliminating a major annoyance associated with typical speakerphones.

The three mics can be individually muted for private conversations, and you can plug in additional mics for very large meetings. You can also tap a cassette recorder into the Conference Link to record conversations. An adapter is available for using the device with digital phone lines and PBXs.



The CS1000 is priced at $399.95.

U.S. Robotics; 847.676.7010; www.usr.com



Takes a licking...

FieldWorks' new laptop and notebook computers are designed for harsh environments, such as the recon pod under the wing of an F-16. The Military Spec-compliant FW5000 notebook features a one-piece magnesium alloy chassis that is 10 times stronger than plastic. The chassis is then covered with molded, shock-absorbing rubber, and all internal subsystems are attached using polymer/aluminum suspension mounts. This enables the machine to withstand an operating shock of 100Gs.

Depending on the options selected, FieldWorks' computers can operate in the rain (up to four gallons per hour), in the presence of electromagnetic interference, and in extreme temperatures (from 5 degrees F to 122 degrees F). Prices start at $4,995.

FieldWorks; 612.947.0856

Unwired

With a Ricochet modem and account, plus a laptop or PDA, you can access the Internet, your office server, or a commercial online account from any Metricom service area (currently Seattle, Washington, D.C., and the San Francisco Bay Area) without being tethered to a conventional phone line. The service costs $29.95 for unlimited access.

The Ricochet network uses transceivers mounted on buildings and light poles to relay radio signals (using 900MHz spread-spectrum technology) from battery-powered modems. The modems send and receive data at speeds up to 28.8Kbps and cost $299, or rent for $10 per month.

Metricom; 888.466.9473; www.metricom.com

PDA=Personal Drum Assistant

Roland has taken the concept of the PDA and applied it to music. The $595 PMA-5 is a pen-based composition workstation you can hold in the palm of your hand. The device features an eight-track MIDI sequencer, a 16-part multitimbral sound module with 306 sounds 16 drum kits, 600 backing tracks in 100 styles, and onboard effects (including eight types of digital reverb and chorus).

An ad-lib function lets you improvise solos or melodies over the backing tracks even if you don't know anything about music. All functions are accessed through an LCD touch-panel screen, or you can use the serial port to import MIDI files from your PC.

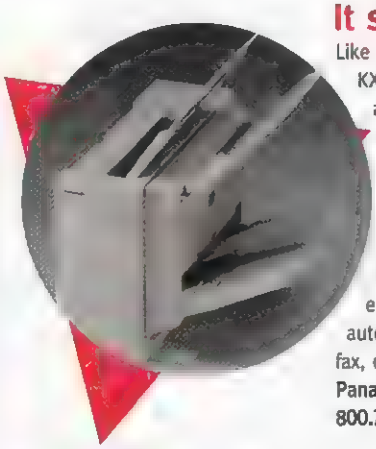
Roland Corp.; 213.685.5141; www.rolandus.com

Let's burn one

Activate the motorized keyboard elevator on Panasonic's new CF-62 laptop ($7,199 for the 16MB model) and a PD rewritable optical drive slides out. The drive, which also reads CD-ROMs at 4x, can store 650MB of data on a PD disc. The computer's design emphasizes removable storage media (the hard disk even comes with a heavily-padded leather carrying case) to lessen the risk of losing sensitive data in the event the computer is stolen. With a magnesium alloy lid, the CF-62 is built to last. It's no slouch in terms of display, either. Its 12.1-inch active matrix LCD screen supports resolutions up to 1024x768.

Panasonic Personal Computer Co.; 800.662.3537; www.panasonic.com

It slices! It dices!



Like a digital Veg-o-matic, Panasonic's $799 KX-PS600 combines a laser printer, scanner, and copier into a single device. The laser engine prints six pages per minute at 600x600dpi, the monochrome scanner features 600dpi resolution and 64 halftone levels, and the copier works even if your PC is not powered up. Just plug the KX-PS600 into your computer, install its software, and the device will automatically seek out and configure your fax, e-mail, and word processing software.

Panasonic Communications & System Co.; 800.742.8086; www.panasonic.com

Zip it to my Zaurus

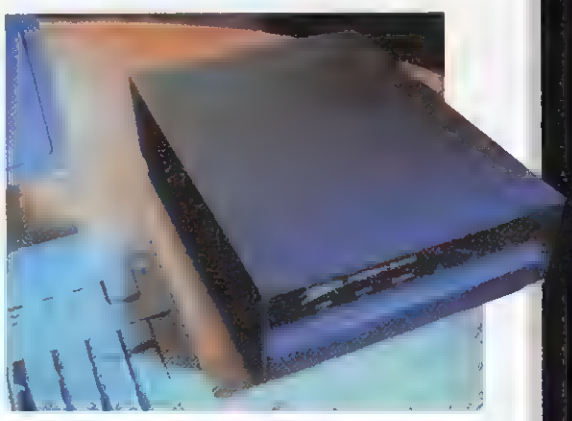
When even a notebook is too much to carry, Sharp's $729 Zaurus ZR-5800FX PDA offers nearly as much functionality—including a 320x240 pixel touch screen, a fax/modem, a PC Card Type II slot, and an infrared transmitter for linking to a PC or printer. The backlit screen is easy to read even in low-light conditions, such as in a darkened car or airplane. The Zaurus features built-in e-mail software and an Excel-compatible spreadsheet; it can even function as a pager. Sharp recently announced a color Zaurus that sports a built-in digital camera, but they haven't announced when the product will be available in the United States.

Sharp Electronics; 800.237.4277; www.sharp-usa.com

Next best thing to a T1

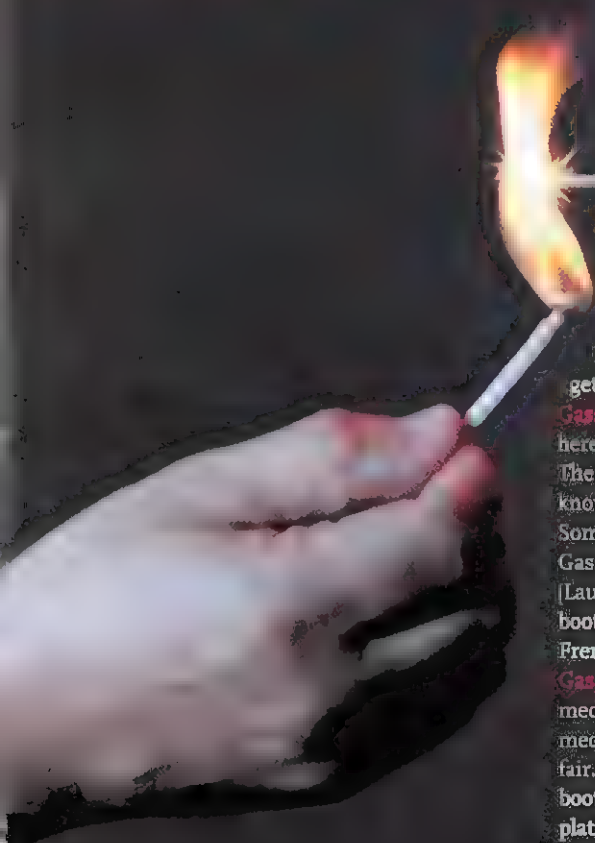
Zenith's HomeWorks Universal cable modem delivers high-speed Internet access (up to a whopping 4Mbps) via your existing cable TV connection. The HomeWorks Universal handles the high-speed downstream connection and links to your conventional modem or ISDN adapter for upstream data transfer. With an investment of less than $60,000 in Zenith and U.S. Robotics hardware, even cable operators with older, one-way delivery systems will be able to offer two-way Internet access. The HomeWorks Universal costs $400 in volume quantities, so you'll probably want to rent the device from your local cable operator.

Zenith Electronics; 847.391.8181; www.zenith.com



Good afternoon,
JEAN-LOUIS GASSÉE:
Others have attempted, but failed, to create a viable alternative for the demanding tech junkies known as "geeks." Your mission, should you choose to accept it, is to scrap all previous notions of what constitutes a PC and build the best system imaginable. Code name: BeBox. Can this flamboyant Frenchman succeed on his…
IMPOSSI
Or will his revolutionary computer self-destruct after its 15 minutes of fame?

BLE MISSION



BY DOUG LOMBARDI

In preparing for this interview, I read a lot of background material on you. The one constant was: You are always referred to as "the flamboyant Frenchman." After a while, doesn't that get to you?

Gassée: I feel comfortable with the culture here because it's a country of immigrants. The political correctness amuses me. You know, "so and so happens to be black." Someday people will refer to me as "Mr. Gassée, who happens to be French." [Laughs] I wait for that day.

boot: Is it fair? Are you a "flamboyant Frenchman"?

Gassée: I never comment on what the media says because everything the media reports is accurate, relevant, and fair. [Laughs]

boot: The audacity to launch an entirely new platform at this stage of the game might qualify you as "flamboyant." What led you to make your own computer?

Gassée: Having experienced the painful forward movement of a mature operating system, we thought it would be a good idea to start with a blank page. We get to keep our memory, but we are freed from our past sins. That's, in a very real way, what drew us to this project. To start with a blank page and say, "OK, let's put what we've learned to the best possible use."

boot: Starting from a blank page? It seems backward compatibility has been disregarded...

Gassée: It's not that it has been disregarded. It has been carefully considered. We weighed the pros of backward compatibility with the cons that come with it. Even a company managed as well as Microsoft needed five years to move from Windows 3 to Windows 95. I look at my friends at Apple

and it will take them seven years to move from System 7 to System 8. It's not because they are inattentive or lazy; it's because it's very complicated. And, it limits the scope of what you can achieve in incorporating new technology. We are the only PC-level operating system with a multiprocessor, real-time, multithreading, multitasking database in the bowels of the operating system. We made a conscious decision to be in places where the other guys couldn't be anytime soon.

boot: So, liberating yourself from previous architectures frees you up to implement cutting edge technologies faster than the big boys. Do the benefits actually outweigh the limitations?

Gassée: The limitations are that we don't have a mature company or a mature product. This is a newborn infant. We need to grow it, with the help of software developers, to give it applications and more solidity. So we have a lot to accomplish.

The good news is our demonstration. We got a standing ovation the first time we showed our product publicly because people could not believe that two tiny 603s at 66MHz, which are the lowest level of PowerPCs, could exhibit such performance. The hardware is normal. It's the software that really shines in those demonstrations. The agility, the throughput, the user interface, the modularity, and the features are the good news. Among the software developers, many say that it's the most fun, easiest to program environment that they've seen in decades.

boot: You've described the BeBox's target audience as "true geeks." Isn't that kind of harsh?

Gassée: What is a true geek? I call them the path-breakers and the ball-breakers. [They're] people who really explore the more innovative uses of computers and generously give us solid feedback.

To buy the BeBox you need to answer four questions. One: Do you own or operate two PCs a day? Two: Do you use or love C++? I'm told using it and loving it is impossible. Three: Do you have an Internet connection? And four: Do you have $2,000 on your credit card? Seriously, the reason I ask people to have two PCs or more is the lack of applications on the BeBox—it's intolerable if you don't already have PCs or cannot program. And if you are not on the Internet, I doubt that we have the same goals, and we won't be able to deliver software.

If you ask the people in the mainstream what they want from a computer, they will describe the future in terms derived from the present. They want more for less. Smaller, cheaper, faster. Which is legitimate. But we need to innovate, and we need the geeks to take us to where the tractor applications lie.

boot: You mention the tractor app, or the "killer app," as it is frequently referred to. Any idea what the BeBox's will be?

Gassée: My guess is that it's in one of five areas: Web servers, image processing, digital audio, digital video, and software development. Let's say that you'd like to develop for one of the emerging game platforms. If we put together a package with an inexpensive, very high-speed machine compiling code and graphics for the game platforms, this could be a nice application. Sun was started as a development environment before it became what we know it to be today. Image processing... all the world of digital photography is creating opportunities to do big manipulations on a grand scale. Digital audio, the egg hiding behind the "V" in "DVD." You'll be able to have real multitrack sound, not tarted up stereo. You know, today's home theater has tarted up old stereo from the late '50s.

[The tractor app is] one or more of these five. It's not in the word processing and spreadsheet market, that's for sure. Even if we had the killer word processor, I doubt we could do anything. But no, I know people who are developing a word processor for the BeBox because they do that. And they'll sell it. But it's not going to be the innovation that we need.

boot: What's the relationship between the BeBox and the Amiga?

> "What is a true geek? I call them the path-breakers and the ball-breakers. [They're] people who really explore the more innovative uses of computers and generously give us solid feedback."

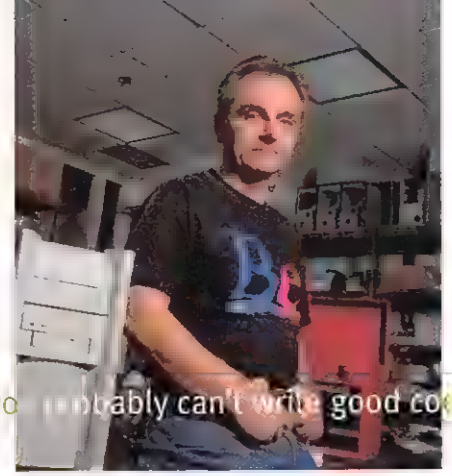
Jean-Louis Gassée
Chairman and CEO of Be Inc.
Bio
1996—Launched the BeBox
1991—Founded Be Inc.
1988-1990—President of Apple products, the R&D and manufacturing division
1987-1988—Apple's senior vice president of R&D
1985-1987—Apple's vice president for product development
1981-1985—Founded and ran Apple's French operation, Apple Computer France SARL
1979-1981—President and general manager of the French subsidiary of Xerox Corp. (known as Office Systems)
1974-79—Data General Corp.—general manager for France, area manager for Latin countries, and marketing manager for Europe
1968-1974—Joined Hewlett-Packard, where he serving in several positions, including sales manager of Europe
1968—Paris/Orsay University: BS Math Physics
1944—Born in Paris, France

Gassée: I had several contacts with the Amiga and Commodore in my past. When the Amiga came out in 1986, I was at Apple, and we were shaking in our boots because we saw a computer with a real multitasking operating system with a 68020 and hardware assists for animation and music and video. We thought, "Boy this is a real threat to us." The Amiga sold a lot of machines, and the Mac sold even more. Commodore, in some ways, killed the Amiga. But there was a healthy development and user community. Some people wanted to buy the company in 1988 or 1989. They needed a CEO and they came to see me. In 1990 when I left Apple, Irving Gould, head of Commodore, wanted me to come and run the R&D at Commodore, which I declined. But this was another opportunity for me to think about what the Amiga brought in terms of digital media. Suddenly we can acknowledge that we are, in more than one way, spiritual descendants of the Amiga. In my office, I even have a license plate that says "Amiga 96," which is a good seven character summary of our business plan. So we'd like to pick up where the Amiga left off.

boot: Aside from actually having a floppy drive and not being tightly targeted at the education market, how does the BeBox differ from the NeXT cube?

Gassée: That's another very useful reference point because it taught us a number of things that we shouldn't do. You mention the education market. If the price wasn't so high, maybe the education market wouldn't be so bad. But the education market is not known to be solvent. There were a number of problems with the NeXT hardware—not to say that our product will not experience glitches and bugs; it will. But perhaps more damaging was the attitude toward the developers. Developers had to shell out a few thousand dollars. They had to write a business plan to be granted the *honor* of developing for the NeXT platform. Our developers get a price cut on the machine—the machine is less than $1,000. And, we don't ask them to write a business plan. If you can write a business plan, you probably can't write good code, and we are interested in people who can write good code. The last dimension is electronic distribution of software over the Web. Cutting all of the middlemen makes it possible for a one- or two-person company to make money without all

"If you can write a business plan, you probably can't write good code..."



Gassée rules the roost at Be's Menlo Park, Calif. offices.

of the obstacles that they'd have to jump through today.

boot: With all these influences, what is the BeBox? More Mac, more PC-clone, or the next generation Amiga?

Gassée: We are on the PowerPC chip, so there is a hardware connection to the Apple world. The bus and all the hardware devices are from the PC-clone organ bank. The digital media inclination of the machine is more with the Amiga world. So you can make with it what you will. I don't know what to make of it.

boot: So you are not competing against the Windows-based clones?

Gassée: Competing against Microsoft or Apple would be a losing proposition.

boot: As a former big wheel at Apple Computer, you have your opinions about the company's current situation. Can it survive?

Gassée: [laughs] If I knew how to take care of Apple's problems I would not be doing what I do. I'd be selling advice. So, I'm not a consultant. But I wish the best to my old friends at Apple. This is a nice company that needs to regain some of its past vibrancy.

boot: Would you ever go back?

Gassée: No.

boot: Apple wants $5 million for the QuickTime license. Will you pay $5 million for it?

Gassée: I was confused. I thought they were going to give me $5 million to promote QuickTime. So I protested that I would not abuse their generosity. But I found out I was mistaken. They wanted $5 million of our money. We spent $10 million to develop the hardware and the software. We can do a QuickTime player without the licensing stuff. MPEG is it in many respects. So, we will focus on that.

▶41

Be specs

BeBox Main Processor Board

The processor board is a six-layer printed circuit board (PCB) with components mounted only on the top surface. Integrated circuits and passives are surface-mounted, connectors are through-hole. The processors are soldered directly to the processor board.

Qty.	Component	Connector
2	PowerPC 603 RISC processors at 66MHz	
8	72-bit DRAM SIMM Sockets	72-pin
1	8-bit flash ROM	
3	32-bit PCI slots at 33MHz	32-bit PCI
5	16-bit ISA slots	16-bit ISA
1	Real-time clock with battery-backed-up NVRAM	
1	Internal SCSI port	50-pin ribbon
1	External SCSI port	50-pin SCSI
1	Parallel port	25-pin D-shell
1	Internal ATA (IDE) port	40 pin ribbon
1	Keyboard port, PC/AT-type	5-pin DIN
1	Internal floppy port	34-pin ribbon
1	Speaker port	2-pin
1	Front panel connector	26-pin ribbon
1	Power LED	
1	Disk-activity LED	
1	Interrupt switch	
1	Reset switch	
1	Bar-graph LED driver	

BeBox I/O Board

Qty.	Component	Connector
1	"GeekPort"	37-pin D shell
4	Advanced serial ports	9 pin D-shell
1	Mouse port, PS/2-type	6-pin mini DIN
2	Joystick ports	15-pin D-shell
2	MIDI out ports	5-pin DIN
2	MIDI in ports	5-pin DIN
3	Infrared (IR) I/O ports	6-pin mini DIN
1	Internal CD audio line-level input	5-pin strip
1	Internal microphone audio input	4-pin strip
1	Internal headphone audio output	4-pin strip
2	Line-level input (L/R)	RCA jacks
2	Line-level output (L/R)	RCA jacks
1	Microphone input stereo phono jack	3.5 mm
1	Headphone output stereo phono jack	3.5 mm
1	16-bit stereo sound system @ 48 and 44.1KHz	

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In the course of bringing together the "ultimate" personal computer, Gassée has drawn from his vast experience at Apple, his respect for the Amiga, and the vast PC organ bank.

◀39 **boot: You've projected the BeBox will sell 100,000 units in the first year. It would seem that, in order to survive, it must sell more than that. Otherwise software developers won't consider it a viable platform and won't want to write for it. How long before it reaches viability?**

Gassée: I am not going to make any forecasts. There's no way we can reach those numbers in '97. Many of the software developers do not expect it to happen because we've been very open about the numeric prospects. If you are a Be software developer, you don't have to abide by the current business models. It's extortion in the software business today. Distributing your software off the Net—protected if you like—you can advertise your software on the Net, you can ship on the Net, you can collect money on the Net. And you can ship in small volumes and be profitable. We're interested in little guys who want to kill the big guys, just as we are the little guys. If you are a Windows software development house today, you probably have no idea how to make money using your existing business model on the BeBox.

"We're interested in little guys who want to kill the big guys..."

Your question is legitimate. And to that the answer is, it's a different business model that does not require the same critical mass.

boot: Inside the BeBox are two PowerPC 603 CPUs, running at 66MHz. Why 66MHz? Was that a price consideration? Or do you believe two medium speed processors can outrun one high speed (200MHz) processor?

Gassée: It's the software that counts. And we observed that software never goes down in terms of other platforms, it only goes up. If you try to make a light version of an operating system, it's horrible. It's sluggish. We started with a fairly modest hardware platform because it's easy to make software that runs at moderate speeds on very expensive hardware. The real art is to make software that runs as fast as ours does on low-priced hardware. That's what we've tried to do. And now we are ready to climb the processor scale.

boot: So we'll see higher megahertz processors in the BeBox this summer? How fast? 200?

Gassée: You know the engineers never tell me anything. I'm just the figurehead here.

boot: We've seen other systems with parallel processors, why should we be excited about the BeBox? Or, in your words, 'What makes the nipples hard?'

Gassée: Yes, yes, yes... the price. Sixteen hundred dollars for a MP [multiprocessor] machine is not what you see in other systems. And you have fresh software. A lot of the MP software is either a custom-made server—and we're not going to compete there—or it's hacked up old software. We provide fresh MP software from the ground up. Hence, the people's reaction at the demonstration. It's performance in terms of throughput per hardware dollar. And it's performance in terms of the simplicity of programming it. So it's performance for the user, performance for the programmer.

boot: The Box has three PCI slots and five ISA slots. Why not something more exotic, such as the Panda Project's Compass passive backplane?

Gassée: I've seen lots of interesting hardware designs. But the only adventure we want is in software. We had to take one risk, and let the rest be totally fed by the ecological niche of the PC world. Basically we feed off that. If something like USB, or as USB becomes product, you'll see us adopt USB. But we don't want to take leadership in hardware standards. There's only one kind of risk we can take: system software.

boot: Why are there three infrared controller ports?

Gassée: You want to be able to control your appliances. The FCC is not regulating ▶120

Be operating system overview

Fast Microkernel
- Virtual memory
- Pre-emptive multitasking (multithreading) on multiple processors (up to 8 PowerPC CPUs in future BeBox models)
- Automatic allocation of threads to processors for the most efficient execution
- Protected address spaces
- Shared memory areas for efficient interapplication cooperation
- Loadable device drivers

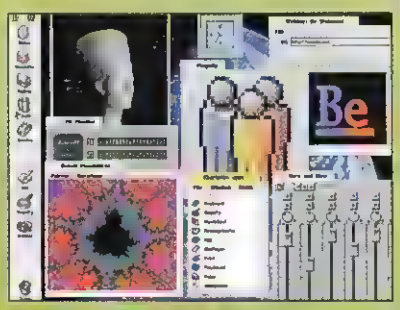
Real-Time Architecture for Processing Audio and Video Data
- Transportation of media buffers through a pipeline of interested handlers
- High-level, object-oriented access to audio and video drivers
- Synchronization of internal clock and external clocks (such as MIDI or SMPTE)
- Prioritization to protect time-critical tasks
- MIDI support

Graphical Interactive User Interface
- Ready-made windows provided by the application server
- Window-specific graphics environments
- A graphical browser for operating the machine and viewing the file system and database
- Off-the-shelf modules for components (such as buttons, scroll bars, and editable text fields)

Networking
- TCP/IP built in
- Direct and dial-up PPP
- FTP and TELNET protocols (ftp, ftpd, and telnet tools)

Object-Oriented C++ Application Framework
- User Interface Kit, Multimedia Kit, MIDI Kit, Networking Kit, Database Kit, and others for developing a wide variety of applications
- Interapplication messaging
- Architecture designed for multithreading (every window has its own thread of execution)

Development Environment
- Bundled Metrowerks(R) CodeWarrior(TM) development environment for the BeBox
- Libraries, header files, and developer documentation provided with every BeBox + Dynamically linked ("shared") libraries



The Be OS facilitates multitasking, such as rendering fractals, display FMV, and mixing multichannel audio.

200MHz MONSTERS in 3D

Feature creatures from **Compaq**, **IBM**, and **NEC**

BY MICHAEL BROWN

You're a power user. You demand more. You crave speed, detailed graphics, rich color, thundering sound, compelling realism—you want it all. Not even Intel's 200MHz Pentium by itself is enough to slake your thirst.

Fortunately, you've been recognized. Compaq, IBM, and NEC know what you want, and they're preparing to battle it out to win your favor. Each company wants to convince you that they have the "ultimate" multimedia system—and each is starting out with a 200MHz Pentium, 32MB of RAM, and 3D graphics acceleration. IBM is already shipping its new Aptiva model C77, which features ATI's 3D Rage chip, and *boot* has a complete hands-on review.

Just one 3D accelerator wasn't enough for Compaq and NEC; each new system (shipping this fall) offers two different video chipsets. We've put each prototype system through its paces in the bootLab, and we have exclusive hands-on previews of both.

Following an industry trend, all three manufacturers have integrated some video circuitry into these machines' motherboards. While purists might cringe at this, the 3D video chipsets IBM, Compaq, and NEC have selected are the best available today. When new, more powerful chips become available, you'll be able to override the original hardware.

Yes, it's a good time to be a power user.

HANDS-ON REVIEW

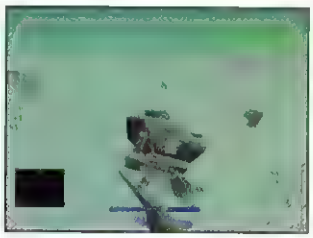
IBM APTIVA C77

You've heard the saying "beauty is only skin deep, but ugliness penetrates to the bone." If you think the Aptiva C77 looks ugly on the outside, wait 'til you crack the case. The beige steel box with its goofy handle hides a set of circuit boards that would have Quasimodo's mother tossing her cookies.

The Aptiva's biggest claim to fame—and its best feature—is its ATI 3D Rage video chip. The chip is on the motherboard (boo!), but it can be shut off when you upgrade (yea!). Unlike the first generation of 3D graphics accelerator chips, the Rage delivers excellent 2D acceleration as well—an important consideration when you're playing games, surfing the Net, or using other software that's been optimized for 3D hardware accelerators. The chip offers a maximum resolution of 1280x1024 with 8-bit color, and a maximum color depth of 32 bits with 640x480 resolution.

IBM bundles optimized versions of *MechWarrior 2* and *VR Soccer* with the machine. Although the 3D Rage version of *Mech 2* looks spectacular, with richly textured surfaces and clouds that scoot across the sky, both games are relatively old; if you like these games, you probably already own the non-accelerated versions. Once the 3D Rage has been on the market for a while, developers will design games optimized for it. Only then will we see what the chip is truly capable of.

As it is, the Aptiva scored an impressive 23.4 million pixels per second on Ziff-Davis's Graphics WinMark 96 (at 800x600 resolution and 16-bit color depth). The system pumped out a stunning 72fps playing *Duke Nukem 3D* at 320x200 resolution, 32fps at 640x480, and 16fps at 800x600.

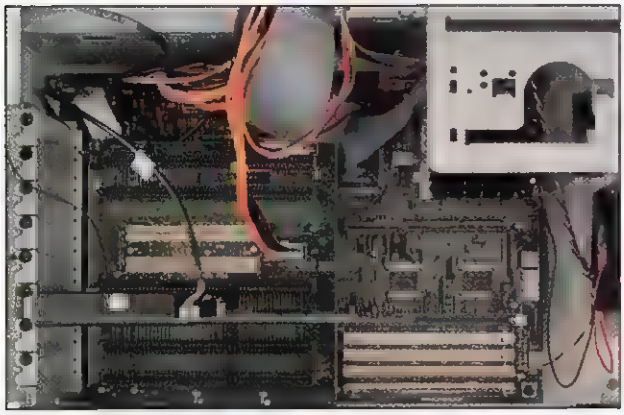


This is *MechWarrior 2* running on a conventional graphics card. Note the banding in the color palette and the absence of texture details.

This version of *MechWarrior 2* was optimized for the ATI 3D Rage chip installed in IBM's Aptiva C77. Note the smooth texture maps and enhanced detail.

But back to the ugly case: The huge handle does serve a purpose: Remove two screws, grab the handle, and you can slide the heavy steel case off the chassis from the front without having to pull any cables from the back. Cool! (There's also a recessed handle on the back of the chassis, which makes it easy to pick up.) Inside, you'll discover an IBM motherboard with a riser board containing six ISA slots but only *two* PCI slots—and one is shared with an ISA slot. Having only two PCI slots is bad enough, but who's the wizard who decided to put the riser board's power-supply connector right between them? The machine is equipped with 32MB of EDO DRAM in four 8MB SIMMs. But there's also a vacant DIMM slot, so you can add RAM without throwing away any existing SIMMs.

Adding a card to the bus requires snaking it through a criss-crossing jungle of cables. There's plenty of room inside the case for full-size boards, but IBM decided not to install brackets at the far end of the case to support their weight. If you need more storage than is provided by the 3.2GB EIDE hard drive, you'll find



The Aptiva C77's expansion slots are obscured by a tangle of cables, including a power cable that plugs in directly between the two PCI slots.

two open 3.5-inch drive bays (only one is accessible from the front) and one front-accessible 5.25-inch bay. You'll find a USB port on the backplane, (although there are not yet any USB devices on the market).

The Hitachi CDR-7930 8x CD-ROM drive delivered an acceptable CD-ROM WinMark score of 725KB/sec, but it doesn't have a headphone output, so you'll have to listen to audio CDs through IBM's mWave-powered Dolphin sound/telephony card. Trust me, you'll quickly be in the market for a new sound card. In most games, the Dolphin emulates an FM-synth Sound Blaster (as opposed to a wavetable-synth Sound Blaster). The card's digital audio capabilities are also weak. That's a shame, because the powered speakers bundled with this system kick.

The Aptiva has some performance features, and it's available now. That's the good news. But its expansion bus design is a chamber of horrors, and its sound card is a joke. Plus, its $3,499 list price is $200 higher than Compaq's projected price for the Presario 8710 (which will have two 3D accelerators and far superior sound), and the IBM's price matches NEC's 200 MHz PowerPlayer, which will also offer two 3D accelerators—the ATI 3DRage *and* the 3Dfx Voodoo chipset. With this competition—and with Sony poised to jump into the market with its own 3D-accelerated machine—IBM needs to produce something exotic to rise above the fray.

	NEC Power Player 2001	Compaq Presario 8710	IBM Aptiva C77
Price	$3,499	$3,299	$3,499
Core Logic	Intel Triton VX	Intel Triton VX	Intel Triton VX
External Cache	256k pipeline burst	512k pipeline burst	256k pipeline burst
System Memory	32MB to 128MB EDO DRAM	32MB to 128MB EDO DRAM	32MB to 128MB EDO DRAM
Expansion bus	3 ISA / 3 PCI (1 shared ISA/PCI shared, 1 PCI slot occupied)	3 ISA / 3 PCI (1 shared ISA/PCI) (Modem occupies proprietary feature slot)	6 ISA / 2 PCI
Hard drive	3.2GB EIDE	2.5GB EIDE	3.2GB EIDE
CD-ROM drive	NEC MultiSpin 6x4 changer	8x (from various suppliers)	8x Hitachi CDR-7930
Video chipset	**ATI 3D Rage** with 2MB EDO DRAM •1280x1024 / 8-bit **3Dfx Voodoo** with 4MB EDO DRAM- •1024x768 / 16-bit •800x600 / 24-bit •640x480 / 32-bit	**S3 VIRGE** with 2MB EDO DRAM •1280x1024 / 8-bit **NEC PowerVR** with 4MB EDO DRAM- •1024x768 / 16-bit •800x600 / 24-bit	**ATI 3D Rage** with 2MB EDO DRAM •1280x1024 / 8-bit •1024x768 / 16-bit •800x600 / 24-bit •640x480 / 32-bit
Data path	64-bit	64-bit	64-bit
Synth	Yamaha OPL4 FM/Wavetable (on motherboard)	AMD InterWave (1MB sounds in ROM, plus 512k sample RAM, expandable to 5.5MB sample RAM)	IBM mWave DSP chip on telephony card
Speakers	Advent AV370 (20 watts/channel plus 30-watt subwoofer)	JBL Pro Premium (10 watts/channel plus 20-watt subwoofer)	IBM Aptiva Model 20
Communications	33.6 DSVD fax/modem full-duplex speakerphone	33.6 DSVD fax/modem full-duplex speakerphone	28.8 DSVD fax/modem full-duplex speakerphone
Peripherals	Thrustmaster Mark III Flight Control stick Advanced Gravis Multiport w/2 GrIP gamepads	ThrustMaster gamepad	

Software Bundles

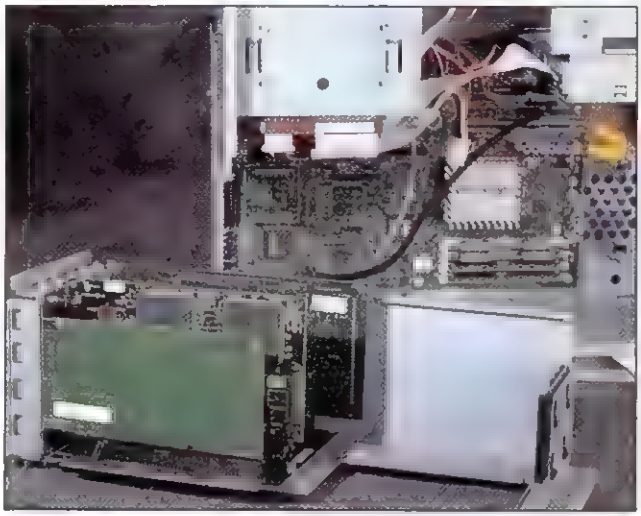
NEC: *Battle Arena Toshinden* for 3Dfx Voodoo, *Descent II* for 3Dfx Voodoo, *EF2000* for 3Dfx Voodoo, *MechWarrior 2* for 3D Rage, *Microsoft Works, Money, Bookshelf, VR Soccer* for 3Dfx Voodoo, *WarCraft II, Whiplash* for 3Dfx Voodoo, *Wipeout* for 3D Rage

Compaq: *Cakewalk Express, CorelDraw 5, Flight Unlimited* for PowerVR, *Magic Carpet, MechWarrior 2* for PowerVR, *Microsoft Works, PGA Tour 96, Quicken SE, Studio M*

IBM: *Battle Beast, Caesar II, Lotus Smart Suite 96, MechWarrior 2* for 3D Rage, *Microsoft Encarta, Microsoft Works, Quicken Multimedia SE, Rand McNally Tripmaker 1996, Torin's Passage, VR Soccer* for 3D Rage, *Wall Street Money,* and more

COMPAQ PRESARIO 8710

Compaq is destined to win a few industrial-design awards for Presario 8710's elegant case. But this box delivers plenty of function with its form, including a set of controls for the CD-ROM drive and speakerphone/answering machine conveniently mounted on top of the front bezel: You can operate these components without ever touching the mouse or keyboard. But the 8710 is more than pretty. Powered by a 200MHz Pentium, 512k of pipeline-burst cache, an Intel Triton VX core logic, 32MB of EDO DRAM, and two 3D graphics accelerators sharing 6MB of dedicated video memory, this promises to be one kick-ass multimedia machine.

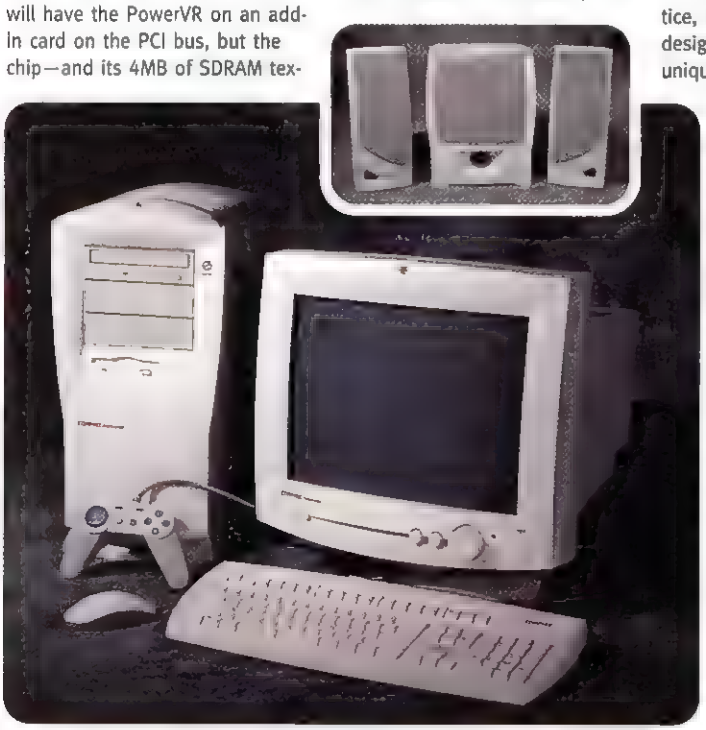


The expansion bus for the Presario 8710 is contained in this pull-out card cage. Removing the cage exposes all the major components on the motherboard.

MechWarrior 2 running on a conventional, 2D graphics accelerator. Note the banded skyline and lack of detail.

MechWarrior 2 optimized for the Presario 8710's PowerVR 3D graphics accelerator. Note the dithered skyline and the detailed texture mapping used to display terrain elevation.

The 8710 will use S3's ViRGE chip for both 2D and 3D graphics acceleration, but Compaq is more excited about the PowerVR chip produced by the partnership of NEC Electronics and VideoLogic. Compaq's early production runs will have the PowerVR on an add-in card on the PCI bus, but the chip—and its 4MB of SDRAM texture-map memory—will eventually be sucked onto the motherboard. (The ViRGE is already on the motherboard, where it shares a 2MB EDO DRAM framebuffer with the PowerVR.) The bundled pre-beta version of *MechWarrior 2* for PowerVR looks spectacular, but it's too early to compare it to its 3D Rage cousin.



Putting a PC's expansion bus on a riser card is a common practice, but the 8710's Compaq-designed motherboard will offer a unique twist: The riser card will be housed in a massive aluminum cage, which can be accessed by removing the machine's steel side panel. To add or remove a card, yank the cage out of the case and roll it over on its back. This design renders all the components eminently accessible.

The 8710 will offer three full-length ISA slots and three full-length PCI slots. One PCI slot will be occupied by the PowerVR card, one ISA slot will be occupied by the sound card, and one of each type will be shared. A 33.6Kbps DSVD fax/modem will function in a proprietary feature slot. Compaq is contracting with STB systems for the machine's sound card, which will feature an AMD InterWave wavetable synthesizer with 1MB of samples in ROM. The card will have 512k of DRAM for custom patches plus sockets for an additional 5MB of DRAM. Two USB ports are mounted on the backplane.

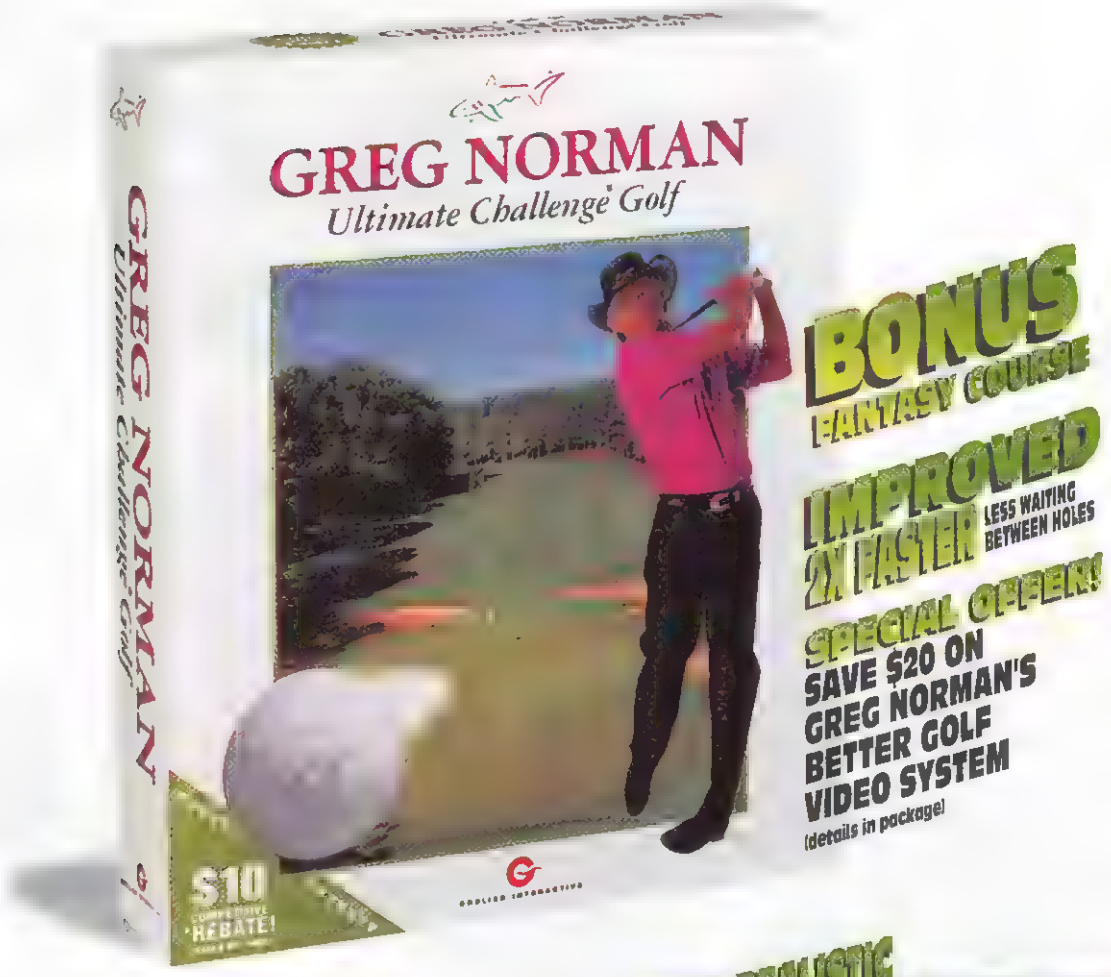
Compaq commissioned JBL to design and manufacture an awesome three-piece speaker system. The satellites deliver 10 watts per channel through 3.5-inch woofers and 10mm tweeters. The subwoofer houses a separate 20-watt amp and pumps bass through a 5.25-inch-long-throw driver. Compaq will also bundle Thrustmaster's new Advanced Gamepad with the 8710. The Playstation-inspired gamepad will have a throttle wheel, an autofire switch, and 12 buttons, including two analog triggers. Each button can be mapped to any keyboard or game-port signal, and custom configurations can be stored in nonvolatile memory within the gamepad's controller.

Priced at $3,299, the Presario 8710 is an enticing package. Look for a complete hands-on review in our next issue.

GOLF REAL!

"Of the dozens of computer golf games we've played, the *'Greg Norman Ultimate Challenge'* Golf CD is by far the most realistic."

--GOLF MAGAZINE, March '96



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NEC POWERPLAYER 2001

NEC is taking a relatively conservative tack with the design of the PowerPlayer's case. The machine will be housed in a minitower with two front-accessible 5.25-inch drive bays and one internal 3.5-inch bay. In addition to offering a powerhouse 200MHz CPU and dual 3D graphics accelerators, NEC's answer to power users' dreams bundles a boatload of peripherals, including an NEC MultiSpin 6x4, six-speed/four disc, CD-ROM changer.

Like Compaq, NEC is squeezing not one, but two, 3D graphics accelerators into its newest multimedia wunderbox. Curiously, NEC Technologies has decided to use the Voodoo chipset from 3Dfx, instead of the PowerVR chip that is being produced by its sister company, NEC Electronics. Does NEC know something that Compaq doesn't?

"We wanted the best 3D accelerator solutions on the market," says Bret Kennedy, NEC Technologies' consumer PC product manager. "The 3Dfx Voodoo is number one, ATI's 3D Rage is number two, and the PowerVR is number three or four." Rest assured, we'll have both machines in the bootLab for a head-to-head comparison as soon as they ship.

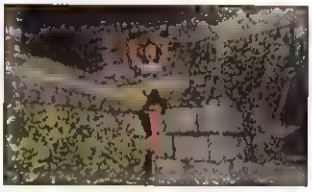
The BCM FM-567 motherboard will feature a 200MHz Pentium, 256k of pipeline-burst cache, an Intel Triton VX core-logic chipset, 32MB of EDO DRAM, a 33.6Kbps DSVD fax/modem, and ATI's 3D Rage chip with 2MB of EDO DRAM video memory. The 3Dfx Voodoo chipset will be mounted on a PCI card with an additional 4MB of EDO DRAM. The PowerPlayer's expansion bus—three full-length PCI, three full-length ISA, one of each shared—will be mounted on a riser card. Unlike most riser-card designs, NEC's will have the expansion cards standing vertically instead of lying horizontally. A front-mounted fan will blow air right down the middle of the bus.

NEC will bundle a number of games, including several that have been optimized either for the 3D Rage (*MechWarrior 2* and *Wipeout*) or the 3Dfx Voodoo (*Battle Arena Toshinden*, *VR Soccer*, *Descent II*, *Whiplash*, and *EF2000*). The most impressive demo, however, is a version of Eidos' upcoming *Tomb Raider* action game, which is optimized for the Voodoo chipset. Once again, games coded from the ground up to take advantage of this hardware will look and play much better than games originally developed for lesser systems.

In addition to the generous software bundle, NEC will bundle an Advanced Gravis MultiPort with two GrIP gamepads, a ThrustMaster Mark III Flight Control system, and Advent's excellent AV370 50-watt, three-piece speaker system.

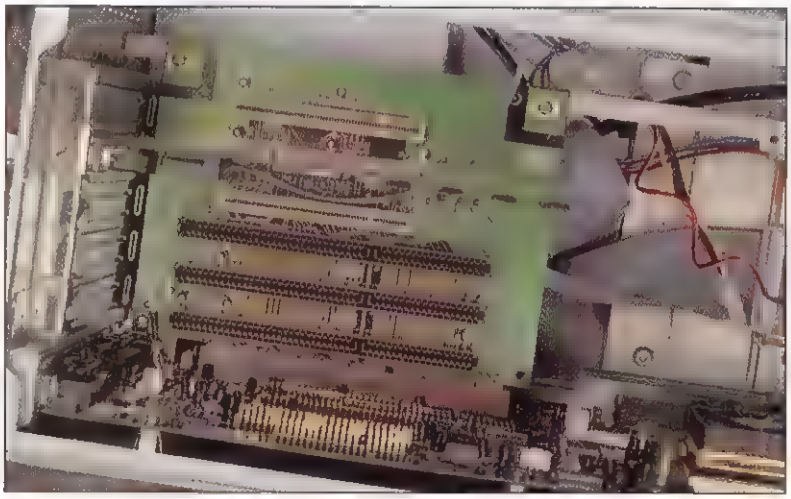
Unfortunately, it looks as though NEC is sticking with Yamaha's weak FM/wave-table hybrid OPL4 synth chip—certainly not state-of-the-art technology. Two USB ports, will be mounted on the backplane.

At $3,499, the PowerPlayer 2001 matches the price of the IBM Aptiva C77, but you'll be getting two powerful 3D graphics accelerators instead of one.



Tomb Raider running on a conventional graphics card doesn't look nearly as compelling as...

Tomb Raider optimized for the 3Dfx Voodoo chipset in NEC's new PowerPlayer 2001.



This top-down view inside the NEC PowerPlayer 2001 reveals the accessibility of the machine's expansion slots. The motherboard is mounted vertically in the case.

Contact Information

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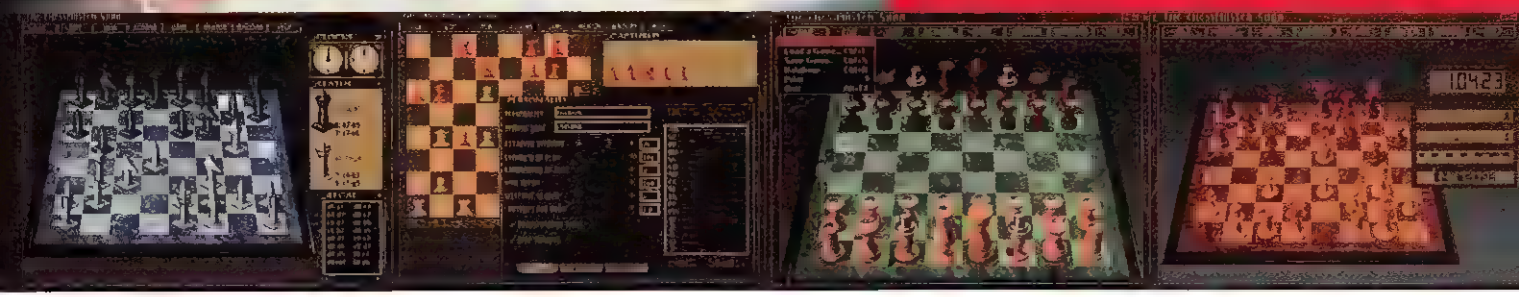

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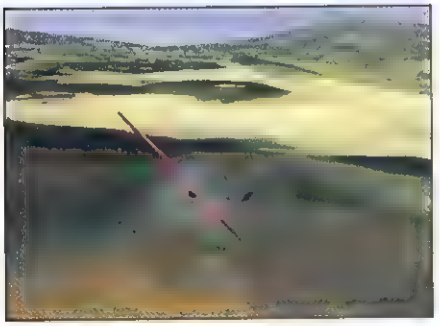
Product Information Number 108

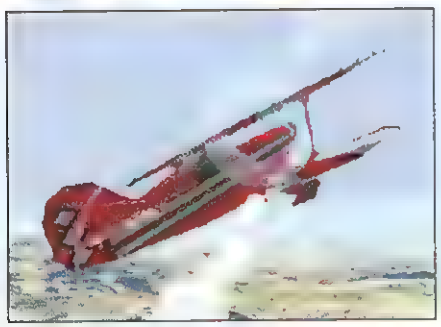
MINDSCAPE®

Powered by a generation of **faster** processors and fancy graphics accelerators, the **new** breed of flight sims delivers. Developers are **pushing** the envelope of flight sims way beyond the limits of today's hottest titles. The sims of **tomorrow** will look better, run faster, and deliver unheard-of **realism**.

BY LEE BUCHANAN

RENDER





Imagine an environment so convincing that you might forget for a moment that you're sitting at your computer—and not rocketing through the air, locked in a life-or-death struggle with nothing less than the fate of the free world in your hands.

The most important developments coming up in flight sims will create that illusion by focusing on three areas: rendered terrain graphics running through 3D graphic accelerator boards, realistic simulation of combat and flight, and multiplayer capability, be it over a LAN or a modem.

TIME TO CATCH AIR

Though five years old, *Falcon 3.0* remains the benchmark for many virtual pilots. With its emphasis on realism and multiplayer combat, *Falcon 3.0* pointed the way toward the future of flight sims.

With the scheduled winter arrival of *Falcon 4.0*, MicroProse (the company formerly known as Spectrum HoloByte/MicroProse) promises an unprecedented level of realism in graphics and gameplay—plus a real-time war raging on the ground below you.

Surprisingly, MicroProse has elected to accelerate *Falcon 4.0*'s graphics via Intel's 3DR API and not Microsoft's Direct3D. Although it has been rumored that Intel may recall or at least withdraw support for 3DR in an effort to maintain friendly relations with Microsoft, *Falcon 4.0*'s designers are flying with the existing 3DR and not waiting for Microsoft to release Direct3D.

"The choice was made on what was available," says Scott Randolph, senior graphics engineer at MicroProse. Randolph also said Microsoft's Direct3D is a less effective API for accelerating the graphics of a modern day flight sim. "If we were starting a new title today, we still might not use it," says Randolph. "Microsoft avoided some technical issues that compromise the performance and take away from the game."

In addition to flying over graphically accelerated terrain, *Falcon 4.0* pilots will carry out their missions in the midst of a

ING *on the* FLY

The Future of Flight Simulators

"As a pilot and a flight sim enthusiast, the next logical step is to develop more realism with the flight models."

realistic, constantly evolving battle on land, at sea, and in the air while using the Campaign Manager. Every bridge you blow up, base you take out, and ship you sink, will be registered by the game's A/I and will, in turn, affect the course of the war being waged.

Falcon 4.0 will follow the *Falcon* tradition of supporting network and modem play. Over a LAN, 16 players will be able to join and leave an ongoing campaign in real time. The game will also provide multiplayer battles over the Total Entertainment Network. MicroProse is not going to limit the number of players *Falcon 4.0* can support on TEN. That will be dependent on each server's performance capability.

Another highly anticipated sequel preparing for takeoff this winter is *Red Baron II*, a World War I sim from Sierra. Gary Stottlemeyer, *Red Baron II*'s director, was the lead designer on *Falcon 3.0*. In addition to exchanging designers, Sierra and MicroProse both have plans to release historical sims in the near future. With another currently-unnamed historical sim from Empire heading to the runway, you have an onslaught of nostalgic sims heading our way.

Initially *Red Baron II* will not support any of the 3D APIs. An add-on pack is expected next year, however, to optimize the game for 3D acceleration and Internet multiplayer modes. Since Sierra has business agreements with the Imagination Network, you can expect its online debut to land in that arena.

As for the actual gaming, *Red Baron II* will feature 22 planes and the Career Mode will draw on improved A/I.

A much improved *Comanche 3* is built on Nova Logic's updated terrain rendering technology, Voxel Space 2, which delivers 3D graphic detail to ground and air targets regardless of their proximity.

LOOK OUT BELOW

Interactive Magic, makers of *Apache* and *Air Warrior*, is powering up a whole line of new sims that will be taking to the air, one by one, during the next six months. Bill Stealey, Interactive Magic's chairman, said all of his company's new releases will support Internet gaming, feature the most advanced graphics, and provide the most realistic play possible.

"The trick is creating a realistic battlefield environment," says Stealey. "How do you suspend belief? That's what we're all going to compete on—realistic action, not on those cut scenes of an F-16 taking off into the sunset.

"With the accelerator cards, everybody's going to have good graphics," Stealey says. "It becomes an issue of having a realistic battlefield environment. There's a whole war going on, not just one F-15 against the world."

Interactive Magic's terrain-rendering system (which is currently nameless) will be the centerpiece for the company's new line of modern air combat sims.

"That's what we're all going to compete on—realistic action, not on those cut scenes of an F-16 taking off into the sunset."

"The system is optimized for rendering terrain databases, using satellite photographs mapped onto real satellite altimeter information," said Doug Kubel, Interactive Magic's vice president of engineering and technology. "You'll have both real geometry and real texture."

To keep up the frame rate on slower machines, the system handles data at multiple resolutions. "It auto adjusts based on how far away you are from a piece of terrain," Kubel said. "Terrain very close to you gets presented at a higher level of detail, while something on the horizon gets lower detail."

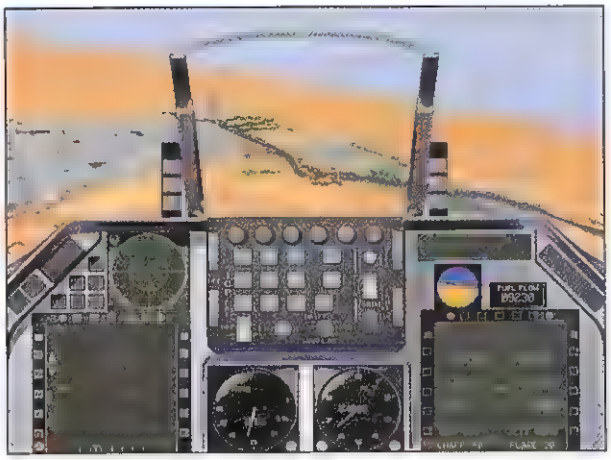
The finest resolution for which altimeter data is available has data points of 180 meters. Interactive Magic is working on a technique to render terrain between those points to fill the gaps in data. Using this technique, a CD-ROM can hold about 100,000 square miles of terrain.

Just about every developer currently working on a flight sim is attempting to achieve the same level of detail via their own proprietary rendering systems. So when you're flying and fighting in a new sim next year, take a good look at the world. It'll be about as real as it can get.

The first title to use Interactive Magic's new rendering system is *F-22 Lightning*, currently scheduled for release in the first quarter of 1997. *F-22* is currently being written to support ATI and Nvidia's proprietary 3D APIs, but is expected to also support Microsoft's Direct3D when released this winter. In the meantime, Interactive Magic will be sending two sequels down the runway: *Air Warrior 2* and *Hind*, the sequel to *Apache*. *Hind* and *Apache* owners will be able to face off over a LAN or serial connection. Those who pick up *Air Warrior 2*

The *Hind* flies in low and takes out an enemy weapons depot with spiral missiles.

Players can test their skills manning the Russians' dreaded Mi-24 E Hind Helicopter in head-to-head network play against its predecessor *Apache*.



Back to Baghdad's flight and combat models are so realistic the U.S. Air Force is licensing a version to train cadets.

battleground. *Baghdad* takes you to the Iraqi capital at a terrain resolution of 20 meters. Six other Iraqi cities are shown in slightly lower detail.

"It's as realistic as we could possibly make it, without going to jail," said George Keverian, vice president of Military Simulations.

Military Simulations is a new company, but these guys aren't new to flight sims. Most of them have military backgrounds and have built some sophisticated flight simulators, including one for Lockheed. In fact, U.S. Air Force cadets may soon be training on a custom version of *Baghdad*, according to sources at Military Simulations.

"3D is going to enable us to do some fantastic things..."

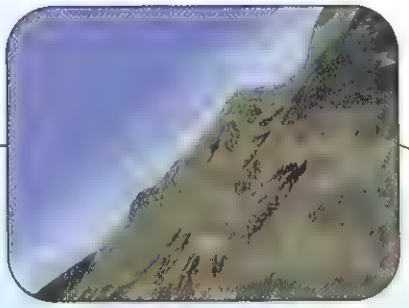
A multiplayer add-on for *Baghdad* will be released later this year, using technology previously limited to military sims. Using a DIS network and MAK technology, the company will be able to link networks, using tunneling technology to connect multiple LANs.

Just fly a few sorties and *Baghdad* proves to be a breathtakingly realistic experience, with anti-aircraft fire lighting up the skies over a city in flames.

One of the sexiest looking flight sims of all time is *EF2000*. Digital Image Design has stepped up with Super *EF2000* for Win 95. To go along with the original's breathtaking graphics, the developers focused on improving the teamwork aspect of combat missions in the new version. As the leader of a strike force of eight aircraft, for example, you can order

will be able to engage in online battles via CompuServe and AOL.

The most realistic combat arena available in a flight sim can be seen in *Back to Baghdad*, a new combat sim from Military Simulations. Thanks to satellite data made available after the Gulf War, Iraq has been transformed into a highly detailed computer



Accelerated on Intel's 3DR API, *Falcon 4.0*'s graphics make you want to kiss the sky.

3D Accelerators

This looks to be the year when 3D graphics technology takes off in PC gaming—and lights up the afterburners of computer flight simulation. The first accelerator cards introduced early this year with chipsets from Nvidia, 3D Labs, and Matrox delivered enhanced graphics. But look for truly stunning results from the new add-in cards and systems with 3D on the motherboard using chips from ATI, Rendition, and 3Dfx.

3D cards allow developers to use much more sophisticated techniques for modeling graphics, including texture mapping for realistic terrain, perspective correction for accurate object rendering, bilinear filtering to reduce aliasing, MIP Mapping to reduce blockiness, fogging to reproduce atmospheric conditions, and alpha-blending, a channel for graphic special effects.

Bottom line: Get ready for richly detailed, finely textured, high-resolution graphics running at frame rates you've only dreamed about.

With 3D accelerators, the 640x480 graphics that have become the standard in flight sims will give way to 1024x768 and beyond, with enough muscle left over to handle faster frame rates. Everyone wants photorealistic graphics, but no one wants to sit and watch a slide show in lieu of smooth flowing motion.

"3D is going to enable us to do some fantastic things," says Doug Kubel, Interactive Magic's vice president of engineering and technology. "For example, we'll be able to do 3D games in 16-bit color at higher resolutions. The industry just recently went to 640, and now we'll be able to go to 1024 and 16-bit color.

"Most of the 3D cards support filtered texturing, so we can get rid of some of the blockiness you see in textures now," says Kubel. "Image quality is going to go up radically. Performance quality is going to go up substantially."

As it currently stands, developers must produce a special version of their game for each hardware accelerator they decide to support. Looking Glass, for example, ported *Flight Unlimited* to Creative Labs' 3D Blaster, and MicroProse is writing *Falcon 4.0* to support cards that use Intel's 3DR API.

Unfortunately, a sim's graphic acceleration is limited to its API. A rush of 3D-accelerated titles is expected when Microsoft finally releases its Direct3D standard for Windows 95, which exists now in beta form only.

This technology "really does provide a whole new level of game playing," said Brian Bruning at 3Dfx, maker of the graphics chip at the heart of Orchid's new 3D accelerator, Fahrenheit Video 3D. "The concentration is on real-time action games: fighting, flying, and driving," he said.

Online Aces

When it comes to flying over the Internet, there are two titles that lead the pack: ICI's *Warbirds* (see a demo on the *bootDisc*), and Interactive Magic's *Air Warrior*. More flight sims will soon be entering the Internet battle scene as the dedicated gaming services reduce the latency issues that have shackled online gaming in years past. Here's a look at some of the services that currently offer or will be offering multiplayer action to flight sim enthusiasts in the coming months.

DEDICATED GAMING SERVICES:

Service: ICI Games
URL: www.icigames.com
Cost: $10 for monthly dues and first five hours, $2 for each additional hour

Service: ImagiNation Network
URL: inngames.com
Cost: $9.95 for monthly dues and first five hours, $1.95 to $2.95 for each additional hour depending on subscription package

Service: Dwango
URL: www.dwango.com
Cost: $7.95 for monthly dues and first five hours, $2 per additional hour, $1.55 per additional hour for a 40+ hour block

Service: Total Entertainment Network
URL: www.ten.net
Cost: TBD (still in beta form)

Service: Mpath
URL: www.mpath.com
Cost: TBD (still in beta form)

OTHER SERVICES:

Some of the established online services—CompuServe, Prodigy, America Online—also offer game zones, but tend to be stuck in the old-school mode with text-based diversions—a far cry from the multimillion polygon experiences that can be found on the dedicated services.

Service: CompuServe
URL: www.compuserve.com
Cost: $9.95 for monthly dues and first five hours, $2.95 per additional hour

Service: America Online
URL: www.aol.com
Cost: $9.95 for monthly dues and first five hours, $2.95 per additional hour

Service: Prodigy
URL: www.prodigy.com
Cost: $9.95 for monthly dues and first five hours, $2.95 per additional hour

Service: GEnie
URL: www.genie.com
Cost: $8.95 for monthly dues and first four hours, $3 per additional hour

individual planes in your squadron to attack separate parts of a target, such as a port or munitions factory.

With the upgrade, *EF2000* supports up to eight players networked via IPX for campaign games and king-of-the-skies shootouts. The game also supports direct serial connection and modem play.

For the future, the company is working on an F-22 simulation based on a new game engine. Whether that bird will fly over a network and the Internet is still being worked out. "We're considering having one machine as a clock for the rest of the machines, sort of like a server," said DID's Nick Clarkson.

"Image quality is going to go up radically. Performance quality is going to go up substantially."

NovaLogic is also gearing up two new titles, *Comanche 3* and *F-22 Lightning II*. *Comanche 3* is a helicopter sim built on NovaLogic's updated terrain rendering technology, Voxel Space 2. *F-22 Lightning II* is being created to accurately simulate the flight model of the U.S. Air Force's aircraft of the same name. *F-22* is not using the new Voxel Space rendering technology. Instead, it is being produced with a new polygon engine custom created for this sim.

THE FRIENDLY SKIES

Believe it or not, there are some gamers who actually enjoy flying without the testosterone urge to destroy anything and everything. Microsoft's *Flight Simulator*, one of the top-selling games of all time, proved the viability of civilian flight sims. In *Flight Simulator*, realism is everything. You navigate from airport to airport, just like the big boys. Each new version steps up the quality of graphics and sound, and there are enough geographical add-ons to fly (seemingly) all over the globe.

For years, *Flight Simulator* was about the only civilian flight sim available, but last year Looking Glass Technologies released *Flight Unlimited*, a dazzling sim that added a new wrinkle to flight sims—stunt flying.

With photo-based terrain graphics, achingly accurate flight models, and extra ordinarily detailed planes and sound effects, *Flight Unlimited* set a new standard for simulating pure recreational flying.

"As a pilot and a flight sim enthusiast, the next logical step is to develop more realism with the flight models," says Mike Sack, product manager at Looking Glass. "The only way to differentiate ourselves is to give people that real flight model."

The next generation of *Flight Unlimited*, due late next year, will take you from the country to the city. "This time we're going to tackle not just scenic locations, but cities and lots of airports," says Sack. Looking Glass plans to support Microsoft's Direct3D with their *Flight Unlimited* follow-up.

Air Warrior II **is the follow-up to *Air Warrior*, the king of online flight sims. The sequel features more than a dozen new airplanes, new ground terrain and improved cockpit graphics, and more than 100 missions that allow players to practice before flying online. *Air Warrior II* is due for released in October.**

Get a Grip on the Future

"Force Feedback" may not be the hottest words on gamers' lips today, but within 12 months, no self-respecting joystick juggler will play without it. Arcade players and high-end simulator jocks are familiar with the way that "active" controls can add to a simulator experience: In Sega's *Daytona USA*, for example, the steering wheel shakes if you drive over the hard shoulder (this is considered "canned" force feedback, as the game only turns a preset shake generator on or off); in a high-end flight simulator, often your entire chair will buck and jolt in accordance with your plane's movements (this is called "smart" force feedback, as it reacts to the specific game environment).

Smart force feedback is coming to your home and is set to revolutionize the home gaming experience.

At its core level, a game is simply interaction between a human player and software running on a computer. If this interaction can be thought of as a conversation, the game "listens" through its keyboard or joystick, and "speaks" via images on its monitor and sound through its speakers. By adding a third dimension to the computer's vocabulary (that of generating "smart" physical movement that the player detects through his joystick or chair), you enhance your computer's communication skills dramatically. When considered in these terms, it's easy to see why a lot of people in the game industry are more excited by force feedback than they are by any new 3D graphics accelerator or sound card that merely yield marginal improvements to established means of computer "speech."

One company (and there are many) hoping to bring force feedback to market in 1996 is Immersion Corp., based in Sunnyvale, Calif. For approximately $150, the company hopes to introduce a stick that, in the words of Immersion Corp. president, Louis Rosenburg, "is basically an input device, like a traditional joystick, but also an output device."

And how does it work? "There are actuators on each of the joystick's axes," Rosenburg explains, "so the computer can independently command a force to the X or Y axis. It's much more sophisticated than a traditional joystick... it has its own microprocessors. Essentially, it's a robot that looks like a joystick and sits on your desk."

Immersion has several demos up and running to demonstrate the force feedback experience. In one, players simply guide a cursor around a simple desktop that has "puddles" of liquids of various viscosity. The joystick "drags" through the puddles, perfectly emulating a sensation akin to stirring thick paint, or spooning treacle. In another demo, a simple game of *Pong* is revolutionized by an elasticized bat and the need to wrestle with your opponent for control of the ball. It must be played to be appreciated.

Force Feedback joysticks add smart physical movement to gaming and extend the realism beyond the screen and into the player's hand.

"What we can do with this technology is really model the dynamics of what it feels like to drive a car into a wall, or pull a loop-the-loop in an airplane," says Rosenburg. "We can simulate the real physical dynamics of anything; a spring, gravity, an elastic band, anything."

— *Neil West*

EXCUSE ME WHILE I KISS THE SKY

Whether you're a fan of modern, historical, or civilian sims, today's flight sims are taking game players to new heights. The legends, such as *Falcon 4.0*, *Apache*, and *Flight Unlimited*, have proven that luscious graphics can be effectively combined with realistic flight models. But these titles will soon be left in the clouds by a new generation of sims.

With the arrival of hardware 3D graphic acceleration and new terrain rendering systems, the graphics will be more than luscious: They'll be amazing. The new A/Is will extend the realistic flight models into realistic battle arenas and challenging war zones. And with reduced latency on the emerging dedicated online gaming services, there will never be a shortage of opponents. Indeed, the next few years promise to usher in a new era of computer simulations, and flight sims will be at the forefront of the gaming revolution.

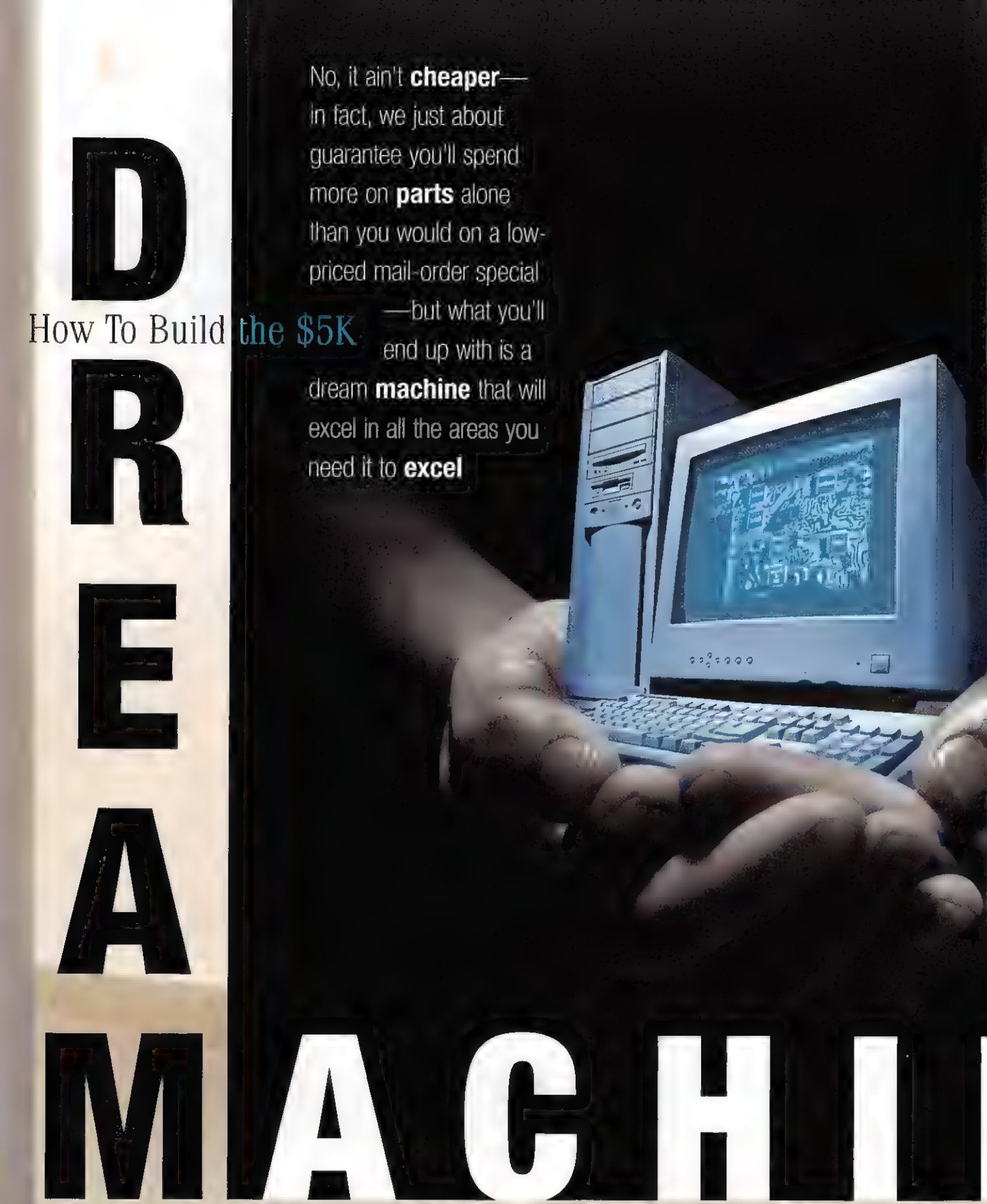
It looks like it's going to be a fantastic day for flying.

A sequel to *Flight Unlimited*, the most demanding sim of all time, is due late next year.

Lee Buchanan *is the senior editor of* Twice *magazine and a contibuting editor to* PC Gamer, *a* boot *sister publication.*

How To Build the $5K DREAM MACHI

No, it ain't **cheaper**—in fact, we just about guarantee you'll spend more on **parts** alone than you would on a low-priced mail-order special—but what you'll end up with is a dream **machine** that will excel in all the areas you need it to **excel**



BY CHARLES BRANNON

COVER PHOTO: MARK MADEO ELECTRONIC MANIPULATION: L. MORRIS

It's a good time to be alive. Five thousand clams buys a honking lot of computer. Enough so that nobody in the neighborhood is going to be able to look down on you any time soon. But don't just rush down to the local Computers-R-Us and write a check. That's sissy. Build your own PC from hand-picked, prime components.
No, it ain't cheaper—in fact, we just about guarantee you'll spend more on parts alone than you would on a low-priced mail-order special—but what you'll end up with is a machine to be proud of.

Full Metal Jacket

None of that cheap plastic crap for you: Start off with a full-size, all-metal tower case that has an easy-access side door. Throw in nothing less than a 300-watt power supply. And don't forget about cooling, either: Get a case with dual fans.

You'll need at least three 5.25-inch drive bays and two 3.5-inch bays. If you have a lot of drives to hook up, get a few extra Y-adapter power cables. Don't worry about turbo lights or buttons, (although you can hook the turbo switch to the motherboard's "sleep" connector if you want to trigger power-saving mode manually).

Boot Recommends: Any full-height metal tower ($150), any 300-watt power supply ($100)

For your Pentium CPU, you want a motherboard built on VIA's VT82C580VP Apollo-VP chipset.

Mother of all boards

Now you have an empty shell. Fill it. If you're a gamer, you'll be running DOS and Windows 95. That means you'll be playing in the 16-bit realm most of the time. And that means you're buying Intel's 200MHz Pentium. Notice we didn't say 200MHz Pentium Pro. Our tests have shown that the Pentium Pro's performance on 16-bit apps easily lags that of the 200MHz P5. If you're serious about 32-bit (read Windows NT), then your choice for speed is the Pentium Pro.

So what about Cyrix and AMD? Also rans? Not quite. Cyrix's 166MHz 686 outperforms all but the zippiest Pentiums. This is a solid CPU for running mixed 16- and 32-bit apps. The NexGen/AMD 586, on the other hand, is pretty lame. It uses an enhanced 386 instruction set instead of true 486/586 instructions. Among other things, that means it won't work with Windows NT 4.0.

Around the corner, look for Intel to introduce 233MHz Pentium CPUs, the new MMX-based Pentium, and the Pentium Pro "Lite" (sans internal cache). The MMX will feature fast integer calculations ideal for graphics and other multimedia applications; unfortunately, you'll have to wait for vendors to release new software versions that take advantage of MMX.

You've decided on the processor, now you need a motherboard. Most of today's motherboards are built from Intel's specifications. But you don't want one from Intel. For your Pentium CPU, you want a motherboard built on VIA's VT82C580VP Apollo-VP chipset. It sports cool stuff, like up to 2MB of L2 cache.

Boot Recommends: 200MHz Pentium ($495) on a First International Computer PT-2003 motherboard (based on the VIA VT82C580VP Apollo-VP) ($1,000)

How To Build the $5k

DREAM MACHINE

Ravenous for RAM

To keep that CPU beast fed, you're going to need some serious RAM and cache. Unfortunately, standard asynchronous dynamic RAM (DRAM) can barely keep up with a Pentium's insatiable memory bandwidth requirements, and the Pentium Pro eats the stuff like candy. DRAM waits until the CPU reads each word of memory before serving up the next and has to periodically take time out to refresh its memory image.

To make up for DRAM's limitations, the system cache in your computer uses static RAM (SRAM) to hold the most recently accessed memory contents. While a 128k cache may be sufficient for a computer with 8MB RAM or less, you need 256k cache for a 16MB or larger computer. Unless your motherboard comes stock with one, upgrading to a 512k cache offers only incremental improvement in systems with up to 32MB of RAM, but can be a good choice for machines with 64MB of RAM or more.

The much-hyped EDO (Extended Data Out) DRAM was introduced as a way to eliminate the expensive and power-hungry SRAM. EDO retains the output of the last word fetched from RAM on its output pins while fetching the next, so the CPU can grab the waiting data whenever it's ready. In addition, this data remains available even while the DRAM is being refreshed. At best, EDO DRAM is only 10 percent faster than its tamer cousin, and in most computers, EDO RAM is redundantly teamed up with an SRAM cache.

Synchronous memory is directly tied to the clock cycle of the CPU, so the memory flows in a continuous stream without the fits and starts induced by DRAM wait states. By teaming synch-burst SRAM with standard or EDO DRAM, memory performance is boosted still further. The ideal, but costly, solution (if supported by your motherboard) is to use SDRAM, or synchronous dynamic RAM, for all your memory, which yields impressive memory performance and in effect provides a cache as large as your total memory.

The ideal, but costly, solution is to use SDRAM for all your memory, which yields impressive performance and in effect provides a cache as large as your total memory.

Boot Recommends: 32MB DRAM ($400) and a 512k SRAM cache (on motherboard)

Catch the Local Bus

The system bus is the backbone of your computer and is primarily used for accessing memory. To access peripherals, your computer can use either the ISA bus, VESA Local Bus, or PCI bus. ISA (Industry Standard Architecture) is the original input/output bus and is still in use today—due to

"BUT I'VE ONLY GOT $3,000..."

A PC pundit once said that the system you want always costs $3,000. That was 10 years ago. These days, what can you get for a measly $3,000? Is this the realm of "doorstop with fan?" Decidedly not. Here's how to make sure you get the most for your mole.

Step 1: Hurry down to your local computer superstore. Enter. Notice the crowds. Notice the saliva glistening on the fangs of the salespeople. Exit. Hurry home. Pick up the phone. Call the direct vendors, such as Dell, Micron, and Tagram. Many of their package deals are amazing. Or they'll build a system to suit your needs, and it'll be cheap. Unfortunately, delivery can take a month. In any event, make sure the following is inside the box.

Most systems have at least three PCI slots and three ISA slots. That's good enough for nearly everyone. The keys to good performance are RAM quantity and CPU speed. For $3,000, the best balance is 24MB of RAM and a 133MHz Pentium. It's cost-effective and still fast. If they ask about cache, ask for 256k—they may offer 512k, but it'd be like putting mag tires on a Honda Accord: fun to boast about, really just gilding the lily.

The next place going to put your money is a video card. Windows 95 is a graphics hog, so don't scrimp here. The PCI-based Matrox MGA Millennium is a perennial favorite. You'll want at least 2MB of VRAM to get all those 1280x1024 pixels going on your screen at 76Hz.

Next you'll need something to plug into your video card. Think 17 inches. For a little more than $800, you can get Sony's Multiscan 17sf II, which sports an incredibly clear and flat Trinitron screen. Warning: Many direct vendors offer other brands. Some of them are OK, some aren't. Few match the quality of the Sony Multiscan. If push comes to shove, order your system sans monitor, and get the monitor from a vendor such as Insight Direct.

Once you can see your new PC, it's time to hear it. Often, salespeople will try to convince you that "it's really Sound Blaster-compatible." Right. And the check's in the mail. Some sound cards sound better than a Sound Blaster (notably Turtle Beach cards), and some are less expensive. But there are just too many applications that assume you'll have a real Sound Blaster. Ask about the price difference between the Sound Blaster 16 and Sound Blaster AWE32. If it's $100 or less, it's probably worth upgrading for the improved quality of wavetable synthesis.

For communication with the outside world, you need a modem. Most system deals come with an internal, uh, internal modem. True, these cards are cheaper than external modems. True, they don't clutter up your desk. Unfortunately, they're also prone to configuration problems and make it difficult to diagnose line problems. But this is a good place to save a few hundred bucks anyway. Supra's 28.8i is a good bet. You'll probably never get 28.8Kbps out of it, but that's true of nearly every 28.8 modem on the market (the problem is in the phone lines, not the modems).

That pundit was right: The system you want is always $3,000.

— John Montgomery

the many legacy expansion cards still in circulation.

The ISA bus transfers data at a measly 8MHz to 10MHz, no matter how fast your CPU. This data is shuttled back and forth in 8-bit or 16-bit chunks. When 640x480 16-color graphics were state of the art, ISA could keep up. But today's applications rely on 1024x768 or higher resolutions with millions or even billions of colors. Real-time graphics need to update megabytes of memory every fractional second. A direct 32-bit connection between the video card and the CPU was needed and inspired the development of the VESA Local Bus (VLB).

But VLB had limitations and was quickly overtaken by Intel's superior PCI architecture. The PCI bus transfers data at either 32- or 64-bits, at speeds as high as 132MB per second. Future motherboards will double this rate. When attached to a PCI expansion slot, a graphics card can receive display data directly from the CPU, which results in sizzling animation and zippy gameplay.

Boot Recommends: three ISA slots and at least four PCI slots (on motherboard)

Video on Demand

Unless you plan to ignore Windows 95 and the next release of Windows NT, your PCI video card must support DirectX and ActiveX, including DirectDraw, Direct3D, and ActiveMovie. (Many current cards will support these via driver upgrades.) To get the most from DirectX, your graphics card must provide graphics acceleration, 3D acceleration, and motion video acceleration.

The best graphics cards use a 64-bit or even 128-bit internal graphics bus. Instead of the slower DRAM memory used with bargain cards, VRAM, WRAM, SDRAM, and other exotic memory technologies allow the card to read and write to the framebuffer simultaneously. Keep in mind that you'll need 4MB of video RAM to get TrueColor graphics at resolutions of up to 1280x1024.

So what card measures up to all of that? The Matrox Millennium with 4MB of WRAM.

LOVE THE **ONE** YOU'RE WITH

You were pretty happy with your computer when you first took it out of the box, but that was last year, and your computer isn't keeping up with the Joneses. Consider these options when upgrading your hardware:

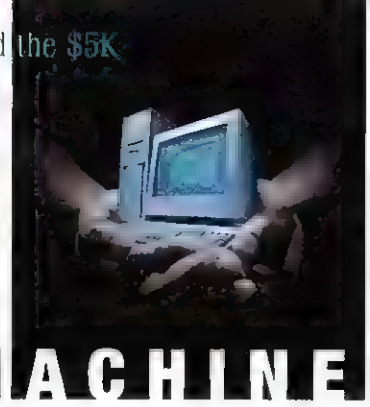
1. Get more memory. 16MB is the minimum; 24MB hits the "sweet spot."
2. Get more storage. Start with an EIDE 2.1GB hard drive and upgrade to a local bus EIDE hard disk controller.
3. Replace your ISA graphics card with a VLB or PCI graphics card. If your 32-bit local bus card uses 1MB or 2MB DRAM, look for a new 64-bit or 128-bit card with 2MB or 4MB VRAM, WRAM, or SDRAM. If you don't have motion video and 3D acceleration, you'll be wanting it soon, once the necessary operating system drivers and the software that take advantage of it become available.
4. If you have a Pentium 60 or Pentium 75, try a Pentium OverDrive upgrade for Pentium systems. Consider upgrading to compatible alternative chips or kits based on Cyrix or AMD CPUs. For the old 486-class machine sitting in the corner collecting dust, get a Pentium motherboard, or a Pentium OverDrive chip for 486 systems.
5. Make sure you have a 4x CD-ROM drive to get the most from games and multimedia applications, but you shouldn't rush into a new 8x or higher speed drive until more titles can take advantage of it. Wait until late this year before buying a DVD drive, since there currently isn't any software available for the platform, and prices are high.

And don't forget to fine-tune your software:

1. Uninstall unnecessary software, delete unused drivers, remove excessive fonts. Consider buying an uninstall utility to help you kkep you system clean.
2. If you prefer Windows 3.1, upgrade to Windows for Workgroups 3.11 and enable 32-bit file access and 32-bit disk access. Use a permanent swap file that's half the size of your physical memory. (Use the 386 Enhanced Icon in Control Panel to set these options.) If you don't use Windows for Workgroups, be sure that SmartDrive is loaded in your AUTOEXEC.BAT file to cache the hard drive.
3. Run a disk defragmenter/optimizer such as the DEFRAG command in DOS 6.x. With Windows 95, use the Disk Defragmenter in the Start/Programs/Accessories/System Tools menu.
4. With Windows 95, upgrade to 32-bit versions of the software you use most often to get the full benefits of multitasking and memory management.
5. Check your CMOS settings (be sure to note the existing settings before making a change). Make sure the internal and external cache are enabled (and set to Write-Back if using a Pentium CPU). Shadow the video and BIOS (unless your video card manual recommends against it). If running Windows, don't cache these ROMs. Make sure the memory is set for Hidden Refresh (in most cases), and is not using excessively conservative wait-state and memory speed settings. Set unused hard drives to type None.

How To Build the $5K

DREAM MACHINE



Now you need a monitor. When you're shopping, remember: It's not the size, it's the frequency. If you want to go very high end, Nanao makes pretty funkin' fine monitors. At $1,000, their 17-inch Trinitron-based T2-17TS display is a bit pricey, but worth it. Gamers might opt to spend that $1,000 on a 20-inch monitor to gain size, but will end up losing a bit of resolution.

Boot Recommends: Matrox Millennium PCI graphics card with 4MB WRAM ($350), Nanao T2-17TS 17-inch monitor ($1,000)

The Old In/Out

Data in. Data out. No matter what else you have, if you have problems in the I/O department, you're screwed.

For best results, you need a local bus IDE (Integrated Drive Electronics) or Enhanced IDE (EIDE) interface, which is frequently built into the system motherboard. While IDE is limited to just two drives and a top speed of under 5MB/sec, EIDE interfaces can run up to four drives (including CD-ROM drives), and max out at about 10MB/sec. To get these speeds, look for drives with support for PIO Mode 3 or Mode 4.

Power users frequently turn to SCSI for superior I/O performance. Not only does Fast SCSI-II equal EIDE's 10MB/sec transfer rate (when attached to the local bus), you can attach up to seven peripherals to a single SCSI host adapter card, and you can access multiple SCSI drives simultaneously (EIDE drives have to take turns on the bus). Fast/Wide SCSI can run at 20MB/sec, and the new Ultra Wide SCSI III hits a new high with a transfer rate of 40MB/sec. A great advantage of this scheme is the SCSI host adapter only requires a single I/O address and IRQ—important because even modern PC designs are limited to just a few free IRQ and conflicting I/O addresses.

For ultimate hard drive speed, ignore the built-in EIDE and spring for an UltraWide SCSI III host adapter such as Adaptec's 2940UW. True UltraWide SCSI drives are only now becoming available; get these in favor of standard Fast/Wide drives. A/V drives cost only slightly more and deliver an uninterrupted flow of data for video and multimedia production. (Even standard Fast/Wide SCSI A/V drives with spindle speeds of 7200rpm are blisteringly fast and cost much less than UltraWide SCSI III.) Late this year, you'll have another option as motherboards with IEEE 1394 and USB interfaces are introduced. You can use an EIDE or a SCSI CD-ROM, and honestly, 4x is as fast as you need if you're using the drive to run off-the-shelf applications, which are optimized for 2x and 4x speeds. An 8x drive (10x drives are just now becoming available) comes in handy for installing software or running some titles directly from the disc. Instead of buying a new 8x CD-ROM, you may get more mileage from a 4x CD changer, which lets you store up to three CDs internally or seven discs externally for information at your fingertips. Anyway, next year you'll be buying the new high density Digital Video Disc (DVD-ROM) drives.

It's a shame that even the fastest computer can do no better than

ONE PC FREAK'S RECIPE FOR THE $5000

Start with a Supermicro P55-T2S motherboard, based on Intel's latest and fastest 430HX Triton II chipset. On board is 512k of pipeline burst cache, four PCI and four ISA slots, and the full range of I/O ports-even IrDA infrared and Universal Serial Bus interfaces for devices that might need them. Right now, we'll save about $200 with a 150MHz Pentium CPU instead of a 166. Very few jobs are totally compute-bound and it's only a 10 percent drop in CPU performance anyway. (Besides, there's a good chance that we can overclock that chip to 166MHz.) Two 16MB 60ns EDO SIMMs give us a comfortable 32MB of RAM.

In order to save a few dollars that are better invested elsewhere in our dream system, Nanao's T2-17TS monitor is a sensible luxury. But the 17-inch DiamondTron picture tube, Mitsubishi's licensed version of the Sony Trinitron design, is wasted without a video card that runs quickly in full 24-bit color at 1024x768 resolution. The Matrox Millennium 3D PCI card offers 3D acceleration with hardware texture mapping, and the 4MB of dual-ported WRAM display memory isn't going to choke at high data rates.

Modern operating systems work the hard disk almost constantly, making Adaptec's AHA 3940UW dual-channel SCSI adapter another worthwhile splurge. You can connect up to seven devices on each Ultrafast Wide SCSI port. (You can hook up almost unlimited storage), and the controller's 40MB/sec maximum data transfer rate should be quick enough for anything.

Let's also get Quantum's screaming fast 2.1GB Atlas drive with the optional Wide SCSI interface, naturally. It costs almost twice as much as an EIDE drive of the same capacity, but none can match the Atlas's 7200rpm rotational rate, 8ms access time or the on-board 1MB of buffer memory. Toshiba's 6.7x SCSI CD-ROM drive has a 256k buffer and a world-beating 110ms access time. Throw in an Epson Zip drive for making backups and trading large files.

The Internet is where it's at, but almost any PC can process data much faster then a modem delivers it. Motorola's BitSurfr Pro ISDN terminal adapter completely bypasses analog phone lines for the fastest Internet connection you can get without an expensive leased line. It's an all-in-one ISDN interface package that doesn't cost that much more than a good DSVD (digital simultaneous voice/data) modem.

There isn't much call for vintage hardware in a modern PC, but it makes sense in one area: Millions of genuine used IBM PC/AT keyboards are available from surplus dealers for around $60 each. A $20 Dexxa mouse and a simple CH FlightStick work fine, and the money saved can go elsewhere, like toward a Creative Labs Sound Blaster AWE32 PnP sound card. But there's no point in having a killer sound card if your speakers can't reproduce the sounds accurately. Altec Lansing's ACS300.1 powered speaker and subwoofer system doesn't come cheap, but it's a multimedia legend.

— Tim Victor

115,200 bits per second using data compression and a 28.8Kbps v.34 modem, but this is the maximum rate of a standard serial port. You can install either an internal modem with a built-in 16550 UART, or attach an external modem to a 16550-equipped serial port (standard on today's Pentium motherboards). A few modems are available with parallel port interfaces. Speaking of which, make sure your motherboard supports the new EPP and ECP parallel port modes for fastest connection to peripherals like Iomega's ZIP drive and EPP printers.

For ultimate hard drive speed, ignore the built-in EIDE and spring for an UltraWide SCSI III host adapter.

Computers introduced late this year and next year introduce the IEEE 1394 and Universal Serial Bus (USB) interfaces. Like SCSI, these interfaces let you attach multiple peripherals to a single computer port. Unlike the expensive parallel cables and termination issues you run into with SCSI, these are high-speed serial buses, which send data one bit at a time at high frequency. The 1394 interface is ideal for hard drives, scanners, tape drives, and consumer electronics equipment (such as digital camcorders), with a starting speed of 25MB/sec to 50 MB/sec, with a potential speed of 100 MB/sec and beyond. The less expensive USB sends data between 10k/sec and 10MB/sec, transferring data asynchronously between devices such as modems, mice, keyboards, and graphics tablets, and providing uninterrupted isochronous throughput for devices such as sound cards and video capture devices. Both interfaces let you plug and unplug devices anywhere on the bus, even while the computer is turned on.

boot Recommends: Adaptec's AHA 2940UW UltraWide SCSI III host adapter ($400) and Quantum 2.1GB Atlas hard drive ($700)

The Well-Endowed PC

There was a time when computers were quiet except for the humming of their fans and occasional squeak from the internal speaker. But today, you need some *bass*. It makes sense to endow a prime computer like this with a great sound card with 16-bit, 44kHz stereo audio and either 3D stereo or surround sound decoding. You'll prefer the superior music rendition offered by a wavetable sound card, which uses actual sampled instruments instead of an electronic synthesizer. Ideally, you can upgrade the memory of the wavetable to add more samples, but off-the-shelf software doesn't require it.

What completes the perfect PC? A comfortable keyboard with 104 keys makes navigating Windows 95 easier. If you use your computer for hours a day, look for an ergonomically sculptured keyboard and an ergonomic mouse to avoid repetitive strain injury. Some keyboards have built-in touchpads or trackballs. If you're into drawing and painting on the computer, add a pressure-sensitive graphics tablet.

But what red-blooded computer geek could stop there? Get a video capture card or digital camera, a color flatbed scanner, six-piece surround sound speaker system with subwoofer, color laser printer, and VR headgear. If you know what you want and are willing to invest the sweat to make it a reality, you can own the machine of your dreams.

DREAM MACHINE BREAKDOWN

Component	Source	Price
Supermicro P55-T2S motherboard w/ 512k pipelined burst cache	Megatrends Enterprises International	$285
Intel Pentium 200MHz CPU	Micro-Assist Inc.	$495
2 pc. 4MB x 32bit 60ns EDO SIMM	Memory Man Inc.	$314
Nanao T2-17TS monitor	Automated Tech Tools	$1025
Matrox MGA Millennium, 4MB	ComputAbility	$439
Adaptec 3940UW SCSI adapter	ComputAbility	$419
Quantum Atlas XP31250W	Insight	$729
Toshiba TO3701 CD-ROM	Drive Outlet Center	$199
Epson Zip drive	PC Mall	$199
Sound Blaster AWE32 PnP	ComputAbility	$225
Altec Lansing ACS300.1 Speaker System	ComputAbility	$169
IBM PC/AT Keyboard (used)	Page Computer	$59
CH Products FlightStick	ComputAbility	$33
Logitech Dexxa Mouse	ComputAbility	$23
Motorola BitSURFR Pro	CDW	$348
Tower case, 1.44 and 1.2 floppy drives	Millennium Technologies	$109
Total:		$5070

the boot 12-step program

DEALING WITH YOUR PC **OBSESSION** DAY TO DAY BY BREAKING IT DOWN INTO 12 **EASY** STEPS

this month:

How to create a Web page with panache

Putting together a Web page is easy. Putting together a *power* page, one that won't be an embarrassment to your kids and a source of humor for your colleagues, is a little harder but certainly worth the effort. With *boot*'s patented 12-step plan, even the HTML-naive can post their page tonight.

— *Kurt Cagle*

Netscape - [Source of: http://www.shadow.net/~toe/imf.html]

```
<html>
<BODY TEXT="#FFFF18" LINK="#80FFFF" ALINK="#000225" VLINK="#FF4020">
<head>
<title>The Mission: Impossible Home Page</title>
</head>

<BODY BACKGROUND="bluebac2.gif">
```

All Web pages are composed in a language called HTML that can be generated in any editor capable of exporting plain text. This screen of HTML code from *The Mission: Impossible Homepage* shows the container structure described in step 2.

1 Plan, plan, plan

Decide why you're posting the page: Are you putting up your résumé? Discussing your hobby? Showing off your kids? A Web site, like any document, requires design and forethought to make it readable, engaging, and informative. Your first major design decision is: Which browsers to support? *Netscape Navigator 2.0* is the most popular (and the one we'll use), but Microsoft's *Internet Explorer* is growing in popularity. Since each supports a few "non-standard" tags, this decision determines what tricks you can pull.

2 Structure

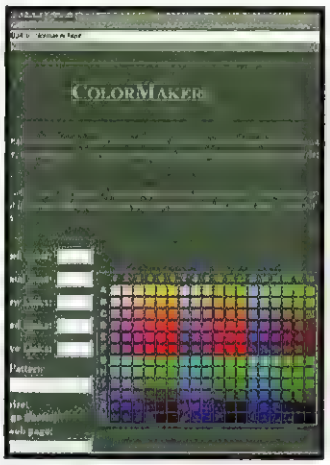
HTML, the language of Web pages, has a ‹*container*› structure: The whole document is enclosed in opening and closing ‹HTML›tags (an opening tag contains the tag ID—in this case HTML, and a closing tag has the same ID preceded by a slash‹/HTML›). The document is then broken into a header section enclosed in ‹HEAD› tags, and a body section ‹BODY›. With few exceptions (such as images or embedded applications such as Java Applets), everything is contained in opening and closing tags: links, text attributes, and scripting code. For examples, take a look at the HTML from any page whose design you like by just going to the Document Source command under the View menu in *Netscape 2.0*.

3 Colors and backgrounds

Netscape's default background is gray, which is OK for showing off black text but probably not something Martha Stewart would approve of. Luckily, you can change the background color by using the BGCOLOR attribute in the ‹BODY› statement. All colors in HTML are specified in *hexadecimal* format. A great tool for working with hex colors can be found at www.missouri.edu/~c588349/colormaker.html (see screen below).

Another BODY tag attribute, BACKGROUND, is used to load JPEG and GIF images as backgrounds. The browser will tile the background images, so match up the left and right, and top and bottom edges for the illusion of a continuous image. For example, *The Mission: Impossible Homepage* sports a cool blue textured background and uses ‹BODY BACKGROUND="bluebac2.gif"›.

The background image file needs to be in the same directory as the HTML document. Note: Pages with a BACKGROUND image should also include a BGCOLOR tag for browsers that don't support the tiled image.



4 Setting text color defaults

If you want your words read, don't make them red on a red background. Contrast is the key. Within the BODY tag, set the default text color using the TEXT attribute and the same hex notation discussed in the previous step. Given the blue background from the last example, yellow text would stand out, so we expand the body statement: ‹BODY BACKGROUND="bluebac2.gif" TEXT="#FFFFD0"›. You can also set the color of link text, using the attributes LINK, ALINK (for active, or pressed, links), and VLINK (for visited links).

5 Changing text characteristics

In HTML, type sizes are designated from ‹H1› down to ‹H6› with ‹H1› being the biggest and usually used for the page's main headline or title, ‹H2› a subhead, and so on. The body of your text should be left without an ‹H› tag so it will default to the standard legible size. On the *Mission: Impossible* page, the headline is a GIF file (see next step for inserting graphics). The "Mission" subhead text is coded ‹H2›Mission‹/H2› and the body is set at ‹H3›. Designers discovered the Web and these limited tags were joined by descriptive tags, such as ‹B› for bold, and ‹I› for italics.

6 Images

If all content on the Web was text, design would be simple. It's not (as the numerous hits on the Playboy site illustrate). Fortunately, picture support was added early in the evolution of HTML, and the Image tag ‹IMG› bristles with features. Loading an image into a Web site is as simple as specifying the source of the image, relative to the current directory, using the SRC attribute. Let's say we have a logo file called *logo.gif* in a subdirectory called *images*. Accessing the image is simple: ‹IMG SRC= "images/logo.gif"›. Note the forward slash—the Web follows Unix rather than DOS conventions. Image tags should also note WIDTH and HEIGHT attributes to allow text to flow while larger images download,‹IMG SRC="images/logo.gif" WIDTH=100 HEIGHT=80›. These tags can also be used to scale images by deviating the numbers from the actual pixel dimensions of the target image. If your image consists primarily of flat colors, use the GIF format; JPEGs work best with photographs.

7 Positioning text and graphics

Because most browsers allow pages to be variously resized (and your content subsequently reflowed), you should design for the screen to be any size. Luckily, there are tags to control the positioning of objects and text on a page. HTML doesn't recognize the carriage return as a character, so paragraphs should be enclosed within ‹P›tags‹/P›. The ‹BR› tag is used to automatically jump to the next line, and unlike most tags, it's not a container (you only need one). Text can be aligned left, right, or centered with the ‹ALIGN› tag. Image tags also have alignment attributes; for example, we can add a "drop cap" graphic by using the following: **‹IMG SRC= "images/dropcap .gif" ALIGN=LEFT›**. It is also possible to create a *rule*, or line, which separates parts of a page; the tag to do this is ‹HR› which can accept both a thickness attribute, SIZE, and a width attribute, WIDTH; i.e., **‹HR WIDTH="80%" SIZE=5›** will make a rule five pixels high that takes up 80 percent of the screen.

```
<TABLE WIDTH="100%">
<tr valign=top align=center>
<td><a href="imf.html#mission"><IMG SRC="mission.jpg"><br>mission</a></td>
<td colspan=3 rowspan=2><IMG SRC="m103.gif"></td>
<td><a href="imf.html#agents"><IMG SRC="agents.jpg"><br>agents</a></td>
</tr>
<tr valign=middle align=center>
<td><a href="imf.html#sound"><IMG SRC="sound.jpg"><br>sound</a></td>
<td><a href="imf.html#schedule"><IMG SRC="schedule.jpg"><br>schedule</a></td>
</tr>
<tr valign=bottom align=center>
<td><a href="gallery.html"><IMG SRC="gallery.jpg"><br>gallery</a></td>
<td><a href="imf.html#movie"><IMG SRC="movie.jpg"><br>movie</a></td>
<td><a href="mailto:toe@shadow.net"><IMG SRC="letter2.jpg"><br>mail</a></td>
<td><a href="imf.html#links"><IMG SRC="links.jpg"><br>links</a></td>
<td><a href="imf.html#stats"><IMG SRC="stats.gif"><br>stats</a></td>
</tr>
</table>
</center>
```

This HTML 3.0 code describes the table of images found at the top of *The Mission: Impossible Homepage* seen below. See Step 9 for more info.

8 Links and anchors

The World Wide Web is the largest hypertext document known to man. A hypertext jump, known as a link, uses the ‹A› tag (which stands for anchor). An anchor is like a bookmark in your page, specified with the name attribute: **‹A NAME="info"›**. To jump to that anchor, make use of the HREF attribute, specifying the named anchor with a pound sign in front of it **‹A HREF="#info"›**. The HREF can also be used to specify the URL of another Web page. Since the anchor tag is a container, any characters contained between the start of the link and its closing tag become underlined and will jump to the location when clicked: **‹A HREF="http://www.bootNet.com"›**This jumps to bootNet**‹/A›**. It's also possible to put an image within an anchor tag, which will cause the graphic to be outlined; to eliminate the rectangular border, set the BORDER attribute of the image tag to zero: **‹A HREF="http://www.bootNet.com"› ‹IMG SRC= "button.gif" BORDER=0›‹/A›**.

```
<center><h2><a name="mission">Mission</a></h2></cen
<h3>Mission: Impossible takes its place in history
greatest American
```

Compare the above HTML to the browser image below. The anchor link tag, ‹a›, is described in step 8.

9 Tables

Web designers want multiple columns of text on a page, so one of the few HTML 3.0 standards that's been universally adopted is tables, which allows text or pictures to be stacked or otherwise positioned in a grid. Tables use the ‹TABLE› tag to contain all the columns, and then table row tags ‹TR›‹/TR› to contain an individual tag row. Each cell within a given row is then contained within a data tag ‹TD›. Within the ‹TABLE› tag it is possible to give the table a border by using the BORDER attribute, as in ‹TABLE BORDER›, and you can also specify the dimensions of the table using the WIDTH and HEIGHT tag, where the values are either given in pixels or as a percentage ‹TABLE BORDER WIDTH="80%"› will create a table that is 80 percent of the screen width's dimensions. See the sample HTML document for a table in action.

10 Embeds

Java, Shockwave, and other external applets can all enhance your site. And adding them is simple. With a Java applet, all you need is to include the source of this file and the size of the window you wish to display the applet in: **‹EMBED SRC="myApplet .java" WIDTH=248 HEIGHT=124›**. This convention holds true for most plug-ins. The **‹NOEMBED›** tag takes an image that you can load in place of the plug-in application, and applies it to the last embedded applet: **‹NOEMBED SRC ="sorry.gif" WIDTH=248 HEIGHT=124›**.

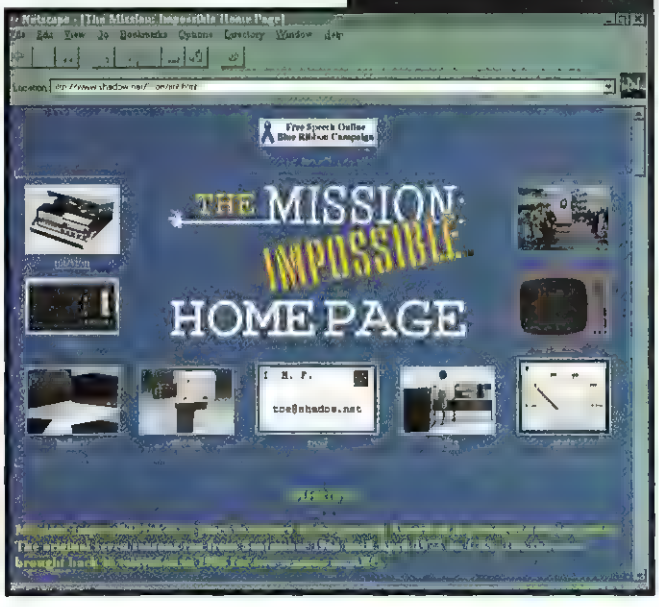
11 Testing and Compatibility

Before you post your Web page for the world to see, make sure they'll be able to do just that. Download as many browsers as you can and see how the page looks through each. Sometimes, there's not a lot you can do (tables are a big problem, as are images), but there are a few tricks that can help. One of the IMG tag's attributes is the **‹ALT›** tag, which will display text if the browser can't show the image: **‹IMG SRC="logo.gif" ALT= "bootNet"›**. Consider creating alternate pages with the **‹PRE›** tags—these will cause all text within the tags to be displayed, including line breaks and spaces. But brace yourself for great ugliness, because the tag is given as a mono font, and attribute tags will no longer work.

12 Publish It

Once your Web page is polished, post it to a site. Commercial services such as AOL and CompuServe allow members to post up to 2MB of Web pages and images. If you're new to Web publishing, this is a good place to start. There are also several Internet Service Providers, or ISPs, in most major metropolitan areas. Contact these services directly for more information about creating and posting to a Web site. Remember, Web pages should be periodically updated—this is a good time to improve your skills with the next version of the *Great American Home Page*.

To compare all the source code described here, check out *The Mission: Impossible Homepage* at www.shadow.net/~toe/imf.html



boot worthy

EACH MONTH, **BOOT** EDITORS COMPILE THE BEST **PRODUCTS** IN A SPECIFIC CATEGORY AND DEEM THEM: BOOT**WORTHY**

this month:

Multimedia Speakers

Heard any good games lately? Developers have made incredible strides toward rendering the gaming experience both more realistic and more film-like. If you haven't noticed, it's probably because your speakers haven't kept pace with the rest of your system. All the best new games offer a digital-audio soundtrack with 16-bit clarity. The best new sound cards offer megabytes of samples in ROM. If you're still listening to the econoboxes that come bundled with most PCs, you're missing out. Dozens of companies offer multimedia speakers; frankly, most of these are crap. But we have high standards: Speakers must be small, magnetically shielded, and they must produce excellent stereo separation. Above all, they must pump both music and sound effects (everything from opera to rock to jazz to screams to shrieking metal to thundering explosions) with equal clarity at any volume. The champions in this category: Advent, Altec Lansing, Bose, Cambridge SoundWorks, and Yamaha.

— *Michael Brown*

Altec Lansing ACS500

PRICE: $399
CONFIGURATION: Two satellites, one subwoofer; Dolby Pro-Logic
COMPANY: Altec Lansing
PHONE: 800.648.6663
URL: www.alteclansing.com

You haven't really played *Wing Commander IV* until you've played the game through a sound system equipped with a Dolby Pro-Logic decoder. Altec Lansing was the first company to incorporate the decoder chip into multimedia speakers, and Altec's ACS500's are the ultimate speakers for this particular game.

The system consists of two satellite speakers the size of the World Trade Center (at 18 inches, they stand taller than a 17-inch monitor, and their footprint measures 7 inches deep and 4.5 inches wide). A pillow-shaped subwoofer, measuring 10 inches deep and 13 inches wide, is also included. If your desk space is tight, don't even consider this system.

Each satellite houses four drivers: Two 3-inch mid/bass, one 1.25x2.5-inch full-range, and one .5-inch dome tweeter. There's a 6.5-inch long-throw woofer in the sub. The satellites deliver 22.5 watts each and the sub pumps out 40 watts.

In a true surround-sound home-theater system, your speakers would be placed all around your viewing/listening area: front-left, front-center, front-right, rear-left, rear-center, and rear-right. This isn't practical when you're sitting in front of a computer.

Altec Lansing ACS500

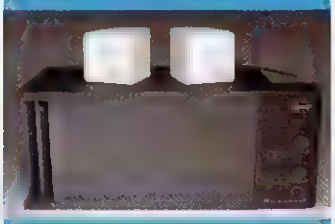
Altec mounted the rear-channel speakers to delay the sound from reaching your ears just long enough to deliver the impression that the sound is originating from behind you. (If you want to go all out, Altec has even included an output jack for a second pair of stereo speakers [add a pair of rear channels] and a center channel.) This is most effective when you're listening to a soundtrack that has been encoded with Dolby Pro-Logic. In the opening video sequence of *Wing IV*, for example, you can hear the pirate ship uncloak behind you almost before you see it materialize behind the hapless fighter pilot. Origin says all its new games will be so encoded, but few other companies have jumped on the bandwagon.

The ACS500's sound great with other types of games as well. I took out a few 'bots playing *Descent II*, and was impressed with the chest-thumping bass that the sub delivered with each explosion.

These aren't the best speakers for the audio purist. Even with the Pro-Logic decoder defeated, the odd placement of the drivers played tricks with the sound field in several of the conventional CDs that I used to test the system.

Bose Acoustimass

PRICE: $699
CONFIGURATION: Two satellites, one subwoofer
COMPANY: Bose
PHONE: 800.444.2673
URL: www.musicwest.com/Sponsors/Bose /bose.html



Bose Acoustimass

Yamaha YST System 45

PRICE: $249
CONFIGURATION: Two satellites, one subwoofer
COMPANY: Yamaha
PHONE: 800.823.6414x399
URL: www.yamaha.com

Yamaha makes great near-field speakers for recording studios, but their multimedia speakers have garnered much less attention. I'm not sure why, because the YST System 45 is fabulous.

This system pairs Yamaha's excellent YST-M15 powered satellites with its beefy YST-SW10 subwoofer. The M15s are arguably the most aesthetically pleasing speakers in this bootWorthy collection, with rounded lines and cloth grilles. The magnetically shielded satellite cabinets are made of plastic; the sub is constructed of heavy compressed wood.

The 3-inch full-range cones in the satellites deliver 10 watts per channel, so they're not nearly as loud as the other speakers in this field. They do deliver punchy bass response, however, even without the subwoofer (Yamaha claims frequency response all the way down to 70Hz). The 6.5-inch speaker in the magnetically shielded sub puts out 25 watts.

▶ 66

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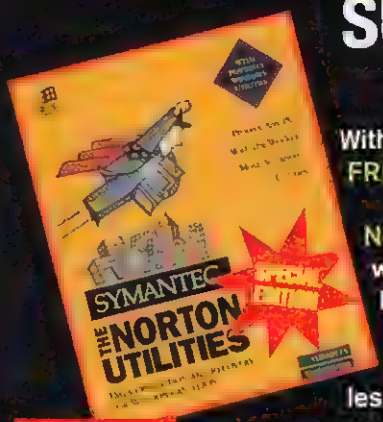

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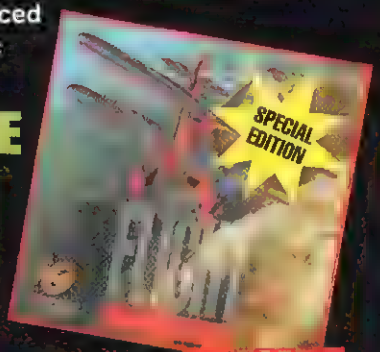

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according to Yamaha, and delivers frequency response ranging from 35Hz to 250Hz.

This is a very efficient system that delivers plenty of sound. The satellites have controls for volume (which also effects the sub) and "tone" (separate bass and treble controls would be welcomed).

The satellites have two sets of stereo inputs—great for playing CDs on a Discman and CD-ROM games at the same time—and a front-mounted headphone output that automatically mutes the speakers when you plug in a pair of phones. Nice touch.

The sub has its own volume control plus a boost/cut switch that determines the frequency at which the crossover circuit kicks in. My biggest criticism of the subwoofer relates to its dome-shaped grille. It sticks out so far that I found myself constantly kicking it.

Bass response is excellent, whether listening to the cacophony of a pipe bomb taking out a stack of gas cylinders, or the thundering kick drum on Joe Jackson's "Down to London."

Yamaha YST System 45

The Yamaha are slightly [illegible] most of the field, but they weren't as present as the Cambridge. Their excellent midrange response brought to the fore a wonderful set of military tom-toms in the *Wing Commander IV* soundtrack that I had never heard before. They were equally adept at delivering Mark Hamill's gravely tenor without turning the bar scene crowd noise into mush.

If you're looking for form as well as function, Yamaha's YST System 45 should be your choice.

Advent AV570

PRICE: $399
CONFIGURATION: Two satellites
COMPANY: International Jensen
PHONE: 800.323.0707
URL: www.adventaudio.com

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Product Information Number 86

Exclusive:

Hands-on Test

Cambridge SoundWorks MicroWorks

PRICE: $349
CONFIGURATION: Two satellites, one subwoofer
COMPANY: Cambridge SoundWorks
PHONE: 800.367.4434
URL: www.hifi.com

Of course, good speakers should deliver more than ear-bleeding decibels, and the MicroWorks don't disappoint.

I just heard these MicroWorks speakers while sitting in a San Francisco hotel room with Cambridge SoundWorks CEO, Tom DeVesto. After a 15-minute listen, I knew I had to have them for this edition of BootWorthy.

MicroWorks is something of a misnomer, because these enclosures are bigger (the subwoofer is considerably bigger) and more powerful than other SoundWorks multimedia speakers. The two satellites are still relatively small, measuring 4 inches high, 3 inches wide and 3 5/8 inches deep, but they offer relatively large 3-inch drivers. The subwoofer, on the other hand, is massive, measuring 9 inches high, 9 inches wide and 8 inches deep. A large port in the middle of the cabinet vents air moved by its 6.5-inch long-throw bass driver.

The satellites come with heavy gauge steel stands that attach to the back of the cabinets using standard tripod mounts. The stands ensure the sound is projected up at your ears, instead of onto your chest.

If you want to speakers on your desk, you can hang them on the wall using the on-the-frame mounts on the back panel. The heavy, compressed wood subwoofer is best placed on the floor.

MicroWorks features a control amp, divided into three channels and housed in the subwoofer cabinet. Master volume control is handled by an in-line volume control (a cabled thumbwheel). Stick one Velcro on the thumb-wheel and you can attach it to the side of your keyboard. A separate control just for the sub enables you to attenuate the bass to your liking.

I conducted a series of listening tests with the MicroWorks using both games and audio CDs. Even at low volume, the massive subwoofer delivered chest-thumpin' bass in *Duke Nukem 3D*; when I cranked the volume, the blast from exploding RPGs rattled the windows and shook the floor.

These babies deliver crystal clear highs and—above all—they're quiet, with almost no distortion at any level. After all, when you advance on a wounded alien to deliver the *coup de grace*, you want to hear the gurgles and snorts of his pathetic death throes, not a bunch of fizz and noise.

After logging a few hours of gameplay in *Duke, Descent II* and a couple of other games, I was time to listen to audio CDs. I picked Lee Jackson's *Blues of*

Desire specifically because the entire project was recorded and mastered in digital (most recordings are processed through analog equipment at some stage before the CD is pressed). The speakers still delivered that chest-thumping bass, but the highs felt almost too bright, at least at high volume. After listening to numerous CDs recorded in a more conventional fashion (including Steely Dan's *Aja* and Tori Amos' *Little Earthquakes*), I'm convinced the anomaly with the Jackson disc had more to do with the way the disc was recorded than the speakers. In the end, the speakers' ability to accurately reproduce the recording almost ended up being a liability. Would I have it any other way? Absolutely not.

Whether you need speakers for near-field monitoring or to fill a large conference room, Cambridge SoundWorks MicroWorks are a sound choice.

Dan Brown

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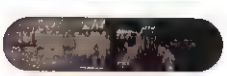
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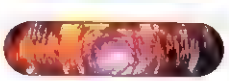
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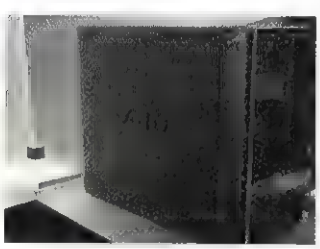
H/W

Sony Jumps Into the PC Market

Pretty case; little innovation

If this were 1986, Sony would be entering the market with a personal computer that would usher in a new era of computing. If this were 1986, Sony would challenge the Wintel monopoly with something new, something exciting, something inventive.

But this is 1996, and Sony, after watching the Amiga, then the NeXT, and quite possibly the Macintosh crash and burn, is jumping into the personal computer market with an Intel-powered, Windows 95-driven system.



Access the Sony's innards through this removable side panel. No tools necessary, it snaps on.

OK, maybe it *was* too much to hope for. Maybe we shouldn't be surprised that the owner of the most recognized consumer brand name in the world won't rock the boat. At least they're forgoing the traditional boring beige case in favor of a custom-designed stylish purple and gray box.

Inside the Box

So what is the Sony PC? The company will initially ship two models: The PCV-70 will feature a 166MHz Pentium, 16MB of RAM, and a 2.1GB hard drive. The PCV-90 will feature a 200MHz Pentium, 32MB of RAM, and a 2.5GB hard drive. The biggest surprise is the absence of a wavetable synthesizer in a computer designed by a company known for its audio products. Sound will be handled by Yamaha's ancient OPL-3 FM chip on the motherboard.

Both machines will offer 256k of pipeline burst cache, an 8x CD-ROM drive, a 28.8 DSVD modem, and a massive software bundle. Video will be handled by an ATI 3D Rage chip with 2MB of video RAM on an Intel Agate motherboard (which Intel designed specifically for the form factor of the Sony PC's squat minitower case). The motherboard has three ISA slots, four PCI slots, and four SIMM sockets. The modem occupies one ISA slot; all the remaining slots are open, with one ISA/PCI slot shared. The motherboard and two open drive bays are accessed by removing a side panel—a better alternative to removing the entire shell. The Agate motherboard looks clean, and in Sony's case, all slots are readily accessible.

Sony insisted on this form factor because it can house a variety of devices, ranging from VCRs to audio CD players, according to Tim Errington, senior vice president of sales and marketing for Sony Information Technologies of America. The gray and violet case, designed by Sony art director Teiyu Goto (who also designed the PlayStation) will feature a door that slides up and covers the CD-ROM and floppy drives.

In a major departure for Sony, a second company's logo will be displayed on the Sony PC's case: The "Intel Inside" sticker will reassure consumers that the Sony PC is not a proprietary system, according to Errington. A third logo, this one belonging to Sony, will be embossed deeply into the front and both sides of the case: VAIO. ("We had to conduct a worldwide search to see which languages we were insulting people in," says Errington.) The acronym stands for Video Audio Integrated Operation, but it also represents "the convergence of the analog and digital worlds (sine wave to the binary 101010)," according to the company's literature.

People who can't understand the complexities of Windows 95 will appreciate Sony's *VAIO Space*, a shell that "works in harmony with Windows 95 and serves as an intuitive user interface to provide quick and easy access to the many key features of the Sony PC," according to Sony. The rest of us will just say no to this unnecessary handholding that among other things, sub-

Designed to accompany Sony's new PCV-70 and PCV-90 personal computer, Sony's new CPD-100VS monitor will feature built-in stereo speakers with a subwoofer in its base.

jects you to MPEG commercials for Sony movies each time the computer starts up.

The Thought Process

For Sony, getting into the computer business was a foregone conclusion. The decision to manufacture a PC based on a foundation over which Sony basically exercises no control, however, was excruciatingly difficult, according to Errington.

"That's a cultural situation that Sony is very unused to dealing with," he says. "Literally having to go to Intel, a third-party manufacturer of such size and importance, and asking them to help develop a product, that's very unusual for us. There have been some speed bumps, as you might imagine."

Following an atypical strategy for Sony, the company designed the Sony PC based not on what is technologically feasible, but on the results of consumer focus groups conducted during the past year.

"Traditionalists within Sony point to the Walkman," says Errington, "and say that focus groups would never have led to the development of such a product. But the Walkman was a miracle. Repeating that success would be very difficult."

Could it be that Sony has already forgotten how its PlayStation marched into the video game console market and pulled the rug right out from under competitors Sega and Nintendo? Doesn't the company see the same opportunity in the PC market?

"In the classic PC market, probably not," Errington says. "Obviously, we're late to market with this. What has driven us is the fact that this category has become such a significant chunk of consumer electronics sales. Consumer electronics is our turf. We had to get involved with computers; otherwise, we could lose our leadership position."

Sony's *VAIO Space* wraps a 3D shell around Windows 95.

Combine Sony's actions during the past several years with its existing core businesses, and the company's long-term goal becomes apparent. By acquiring record labels, film studios, software companies, and television production companies—and now introducing its own PC—Sony intends to control a chunk of the production, distribution, *and* delivery of entertainment.

Sony has also designed a new 15-inch Trinitron monitor, the $599 CPD-100VS, which will have stereo speakers built into its sides and a subwoofer in its base. Errington said a 17-inch model is in the works, but that the company has run into some unexpected technical snags. The problem may be the low frequencies produced by the subwoofer are causing the monitor's aperture grille to vibrate. Errington seemed unaware that Nokia Display Products, a company that buys Trinitron tubes from Sony, had already solved this problem by isolating the subwoofer from the chassis. Nokia's 17-inch 447Xav monitor features stereo speakers and a subwoofer in its base.

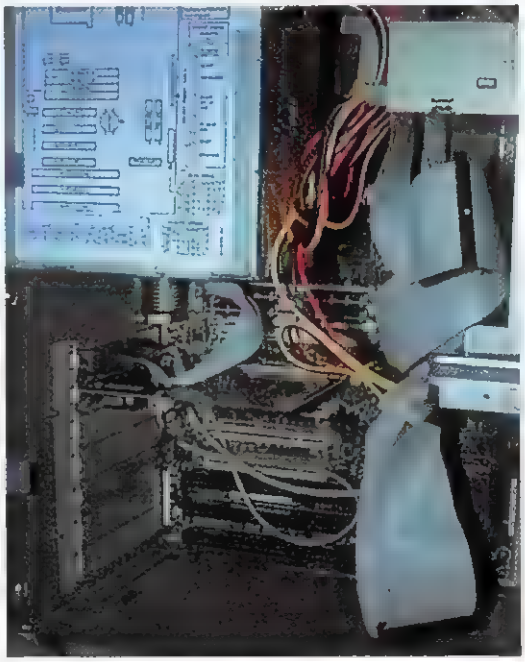
Sony expects its PC to be priced between $2,000 and $3,000 when it ships in August. "We're experiencing some pain realizing we can't expect to command the Sony premium," says Errington of the company's aggressive pricing.

Sony plans to introduce a series of other products that can be used in conjunction with the PC, including a 100-disc CD-ROM changer, in the near future.

Even if Sony won't change the PC paradigm, maybe they'll still produce a few cool peripherals.

— *Michael Brown*

AVAILABLE: AUGUST 1996
PRICE: $2,000 TO $3,000
COMPANY: SONY
PHONE: 800.635.7669
URL: WWW.SEL.SONY.COM/SEL/CCPG/PC/PCCONTENT.HTML



The Sony PC will have an Intel Agate motherboard with three ISA and four PCI slots. Both audio and video circuitry will be on the motherboard.

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S/W

Tomb Raider

The lady's packin'

This prerendered promotional art shows off Lara Croft, *Tomb Raider*'s hard-bitten, testosterone-pumping heroine. It's tempting to make a pun here about silicon, but we'll pass.

Look out folks, Lara Croft is coming. A hard-bitten cross between Indiana Jones and Snake Plissken, Lara is a soldier of fortune who keeps both treasure and big game in her sights.

In Eidos Interactive's upcoming *Tomb Raider*, Lara battles her way across the globe in search of the pieces to the ancient Atlantean Scion, a talisman of incredible power. Eidos might be at risk of raising the ire of the PC (as in Politically Correct) Police. In addition to blowing away human thugs and Atlantean bio-robots during her quest, Lara pumps lead into a number of bears, wolves, and other animals—not to mention raiding ancient burial sites.

The actual game looks nearly as good as the workstation-rendered art. Huge underground complexes present no problem for our motion-captured protagonist.

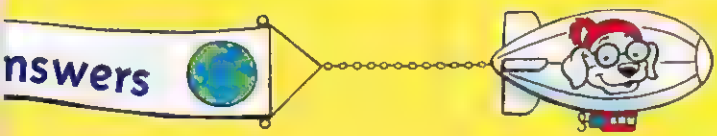
The game utilizes a second-person perspective (the camera looks over Lara's shoulder), which allows the player to see both Lara's actions and those of her on-screen enemies. *Tomb Raider* takes place in seven huge indoor and outdoor locales, ranging from the jungles of Cambodia to the deserts of Egypt.

The graphics will be rendered on-the-fly, according to an Eidos representative, and so far, they look stunning. The character animation uses a motion-capture technique for added realism. The game will run in either DOS or Windows 95, and Eidos says it will take advantage of the feature set in the 3Dfx Voodoo Graphics 3D chipset. Eidos is also considering supporting Microsoft's Direct3D API.

With its lightning pace, extreme violence, pistol-packin' protagonist, and huge, sprawling level design, *Tomb Raider* will have action-game lovers drooling.

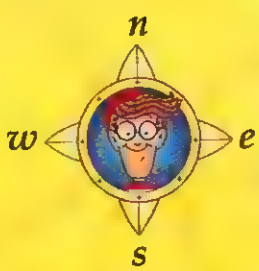
— *Jeff Lundrigan*

AVAILABLE: TBA
COMPANY: EIDOS INTERACTIVE
PRICE: TBA
PHONE: 415.693.0297
URL: WWW.DOMARK.COM



What's the CAPITAL of NORWAY?

What COLORS are used in the FLAG of BELGIUM?



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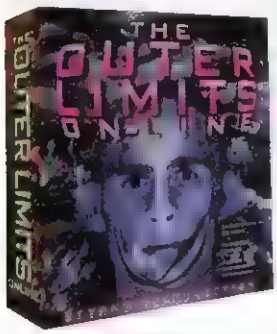
S/W

The Outer Limits On-Line

It's a battle of thousands...

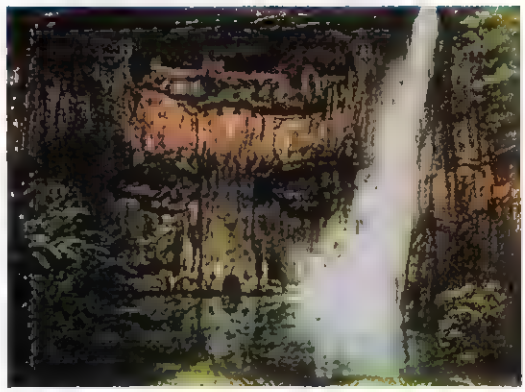
Fans of the 1960s television series *The Outer Limits* have two reasons to be excited: MGM Television has resuscitated the TV show, and MGM Interactive is launching *The Outer Limits On-Line*.



The game will support more than 5,000 online gamers.

An ambitious, role-playing adventure game targeting sci-fi and mystery enthusiasts, *Outer Limits* will offer multiuser online gaming for more than 5,000 players simultaneously. Gamers will assume a holographic character, an avatar, to travel through a 3D virtual universe to battle renegade androids and save the human race. Players can keep the same character for hours, months, or years, and can go it solo or join other players in real time to battle, trade, or travel.

"There isn't anything to compete with it," says Ron Frankel, executive vice president and general manager of MGM Interactive. "It will have a rich graphics environment, audio and textual communication, and unmatched online play." The audio component is currently in design, and avatar pioneer Worlds Inc. is developing a proprietary 3D engine that won't require players to have a 3D graphics accelerator card, according to Frankel. But they will need at least a P75 with 16MB of RAM, Win 95 or NT, a SVGA card, a sound card, and a 28.8Kbps modem to compete in the virtual environment made with a combination of 3D-rendered and polygon-based, real-time graphics.



The *Outer Limits*' virtual environment has 3D-rendered and polygon-based, real-time graphics.

MGM expects to release *Outer Limits* in the first quarter of 1997.

— *Angela LoSasso*

AVAILABLE: FIRST QUARTER 1997
PRICE: TBA
COMPANY: MGM INTERACTIVE
PHONE: 800.646.5808
URL: WWW.MGMUA.COM

If You Don't Know the Answers

to the Preceding Questions...

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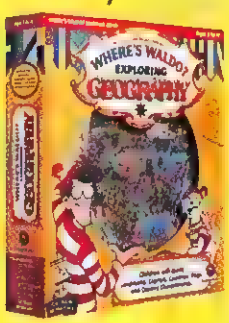
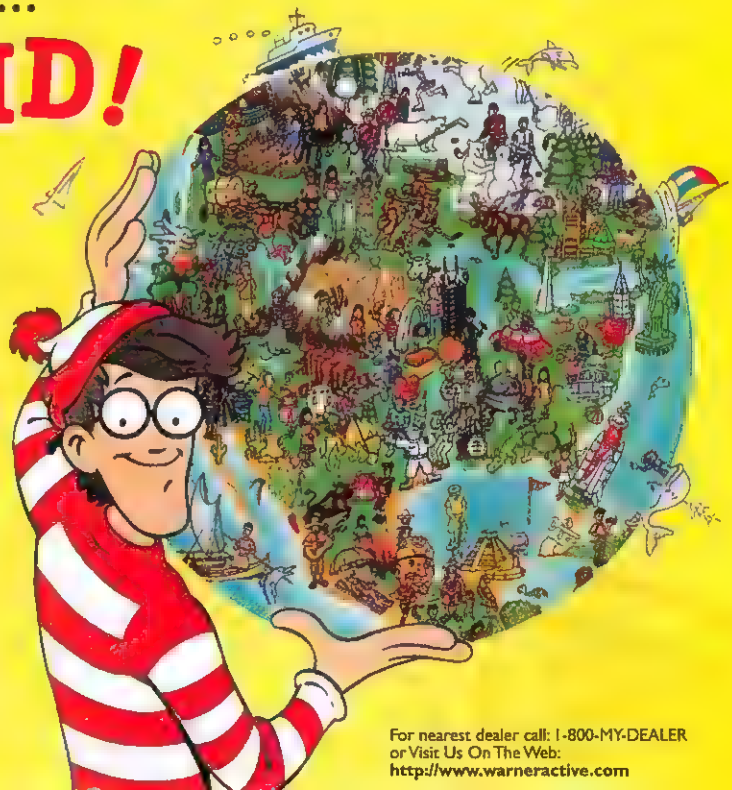
Waldo is going to show your child where in the world the fun is with "Where's Waldo? Exploring Geography." Along the way, kids discover the people and places of our world while developing problem-solving and critical thinking skills. In this exciting CD-ROM adventure, kids 5-12 search for missing athletes so they can help Waldo save the Wacky Worldwide Games. "Where's Waldo? Exploring Geography" lets children—and parents—learn more about the world around them. Including what the capital of Norway is.



Product Information Number 97

WarnerActive

IMAGINATION PILOTS



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or Visit Us On The Web:
http://www.warneractive.com

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S/W

Star Trek Starfleet Academy

Take the Enterprise for a Spin

Your Academy training takes place at Starfleet headquarters in San Francisco.

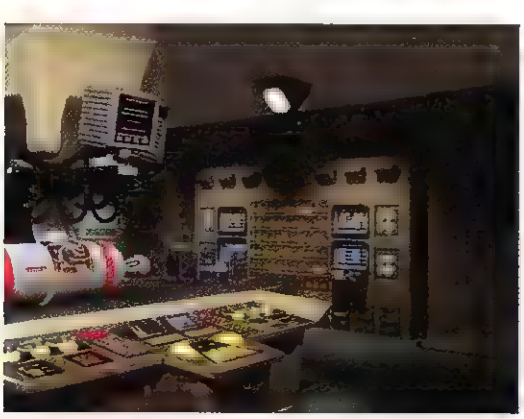
If you're a closet Trekker, meaning you're not the type to go to a Star Trek convention to kiss William Shatner's feet, perhaps you prefer to act out your final frontier fantasies behind the privacy of closed doors. *Starfleet Academy* will obviously attract the die-hard Trekker, but Interplay is really designing the game for the rest of us: normal people who lust to command the Enterprise.

Leadership training is focused around the bridge, where you lead your crew against Klingons, Romulans, and other aliens.

"*Starfleet Academy* is a flight sim for people who have always wanted to command a ship and do things that Starfleet wouldn't allow," says Rusty Buchert, the game's producer. "They just don't want to blow up things, they want to go after a Klingon commander."

In real life, you have to take lessons and get the coveted driver's license before you borrow dad's car. The same holds true for Starfleet: Before you take a Starship out for an intergalactic spin, you better hit the Academy books.

Your goal as a cadet is to complete 27 missions and graduate. Your class rank (whether you graduate first, second, etc.) depends on what decisions you make during the game. Just as graduating magna cum laude from Harvard can have a positive effect on your job prospects, your Academy performance decides your Starfleet future. "There are three endings, including one that allows you to fly your own ship," Buchert says.



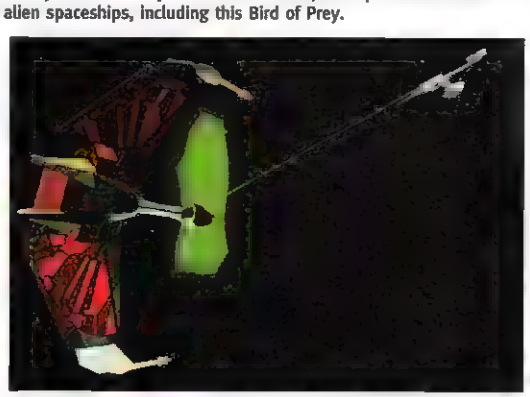
In addition to the flight sim, you'll spend time in the lab learning the finer points of system diagnostics. Where's Scotty when you need him?

If you want to fly, you should seriously consider finding a tutor. Fortunately, *Starfleet Academy* has the best: Kirk, Sulu, and Chekov. The three also offer guidance and support as you tackle simulated missions, subplots, and political situations. "They might even take you under their wing, especially if you're one of the top students," says Buchert.

Leadership training is set in the bridge simulator, where you'll take your team into battle against more than 30 alien ships and scenarios. "We've included scenarios from the original television show and movies, such as the Kobiayashi Maru, which only Kirk had successfully completed—and he cheated," Buchert says. "We have other classic encounters such as the 'Balance of Terror' episode, which was the [Federation's] first encounter with the Romulans, and the *Wrath of Khan*, with some cat and mouse fighting around the nebula." Buchert estimates there will be between 20 and 40 hours of gameplay, and an even longer life span with the eight-player network capabilities. "Combat is different every time," Buchert says. "You won't see the same thing twice."

"They just don't want to blow up things, they want to go after a Klingon commander."

Starfleet Academy missions let you take the Starship Enterprise into battle against 30 alien spaceships, including this Bird of Prey.



You have an arsenal at your disposal, including photon torpedoes and pinpoint-accurate phasers like this one.

Action takes place in real time with 640x480 3D graphics and real-time color light sourcing. "If a red photon shoots over a ship, you'll see a red trail of light," Buchert says. No extra hardware is required, but the game will support all major 3D accelerators.

Starfleet Academy is expected to be released by year's end.

— *Angela LoSasso*

AVAILABLE: FOURTH QUARTER 1996
PRICE: TBA
COMPANY: INTERPLAY
PHONE: 800.969.4263
URL: WWW.INTERPLAY.COM

You're coach, player and general manager of an NFL team.
Better kick ass if you want to protect your assets.

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http://www.philipsgames.com

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Product Information Number 112

S/W

Dark Earth

Combining the best of breeds

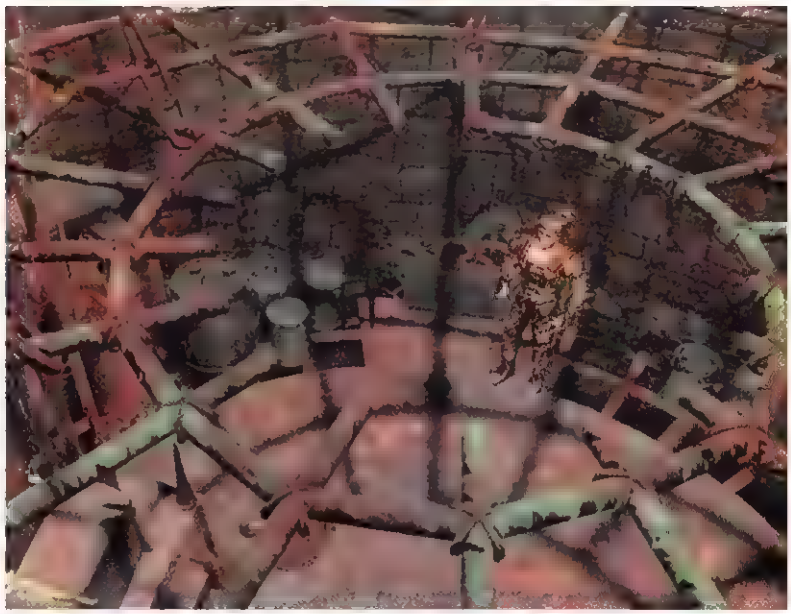
Dark Earth *exhibits the potential to be an incredibly fun game and a visual wonder. We pinned down Kevin Bachus, Mindscape's international development manager, and made him spill his guts about what makes* Dark Earth *so special.*

boot: What is the game's premise?

Bachus: The idea is fairly simple. Somewhere in the near future a comet passes very close to Earth and fragments of the comet strike the planet, kicking up billowing clouds of dirt into the atmosphere. We flash forward 300 years to where the game takes place. There are certain spots on Earth where light comes through, and it's always the same spot. People build civilizations at these locations and don't travel outside of them because there are rumors of creatures scavenging in the dark areas.

boot: What about gameplay?

Bachus: As a character named Arkhan, you are the protector of the ruling committee. In the middle of a meeting there is an attack, and you are poisoned. Over the coming hours and days you transform into something that is not good. It's a story of survival. You have to find out what has happened to you and how to reverse it. In the process, you find out what the meeting was about, why the attack came, who these people were, and you uncover a lot about the secret mystery of *Dark Earth*—the underlying concepts. It's more than light is good and dark is bad, it's more like light is life and darkness is death. Death isn't necessarily bad. It's inevitable.



Dark Earth **features highly detailed 3D backgrounds created with Softimage and 3D Studio.**

A variety of combat sequences, such as sword and fistfights, are mixed into the adventure.

This adventure/action game is the first in a series that are set in the Dark Earth universe.

boot: What's happening in the code to deliver the look and play?

Bachus: Technologically, the game is quite astonishing. It has rendered backgrounds and a lot of different characters. You see your character fully 3D rendered on the fly, texture mapped, shaded with shadow casting—remember light and darkness are very important. It looks and plays a bit like *Resident Evil*, except we're doing everything on the fly with complex shadows and things like that. We are also doing motion capture, so that every character will have 200 movements. We are looking into 3D hardware acceleration. Each character has between 200 and 500 different polygons, but it's being done in such a way that it can go higher when accelerated.

The animation of the game's 80 characters incorporates motion capture technology, which gives them a creepy sense of realism.

boot: It sounds like a mixture of game genres.

Bachus: It's an adventure/action game. There's combat, and we hope the combat will be as compelling as the adventure game. In other words, that both will be best of breeds. One of the things we are still working on is play balancing to make sure that's right.

boot: How are you balancing that?

Bachus: Frankly, I don't know. That's part of the process—going through play testing, working with different gamers, and trying different methods so that it's satisfying. Hopefully, it will be one of the first games to successfully integrate adventure and action.

— Doug Lombardi

AVAILABLE: MARCH 1997
PRICE: $50 (ESTIMATED)
COMPANY: MINDSCAPE
PHONE: 800.234.3088
URL: WWW.MINDSCAPE.COM

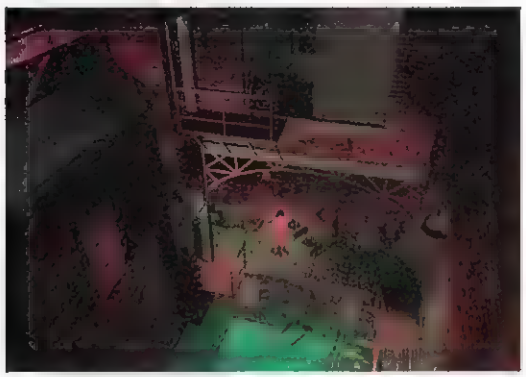
The City of Lost Children

Très fantastique

All of *City*'s characters are fully motion captured.

Psygnosis is transforming the work of French filmmakers Jean-Pierre Jeunet and Marc Caro into a surreal, non-violent 3D adventure game.

Caro is providing artistic direction for the game version of *The City of Lost Children*, which follows a similar plot to the film. A nefarious scientist named Krank who lacks the ability to dream, and is therefore aging prematurely, is kidnapping children so he can tap into their dreams. You'll play the role of Miette, a street-wise little orphan girl, who joins forces with a circus strongman named One to stop Krank by solving a series of puzzles and riddles.



The City of Lost Children's graphics aim to recreate the surreal and gloomy world of the retro-futuristic city depicted in the film.

Psygnosis is relying on Caro to help the graphics team reproduce the film's grand scale and complex visual style. The retro-futuristic imaginary city is being rendered and texture mapped in 3D. All the backdrops will be interactive, and the game will feature impressive lighting effects, real-time shadows, and elegant textures. Achieving quality graphics has been of paramount importance during the game's development, according to producer Carole Faure, who says, "The idea was to get a 3D game without a 3D look."

The game's designers are using motion-capture technology to ensure that the more than 20 characters will look and move realistically. Accurately producing the movement of the wicked Siamese twins (known as The Octopus) who run the orphanage is particularly challenging, according to Faure, because they must combine the models of two different people.

The evil Siamese twins who run the orphanage are just one of Miette's challenges.

Psygnosis expects to ship *The City of Lost Children* in December.

— *Ingrid Bush*

AVAILABLE: WINTER 98
PRICE: TBA
COMPANY: PSYGNOSIS
PHONE: 800.438.7794
URL: WWW.PSYGNOSIS.COM

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SSI

H/W

Fujitsu Notebook Series

The European plan

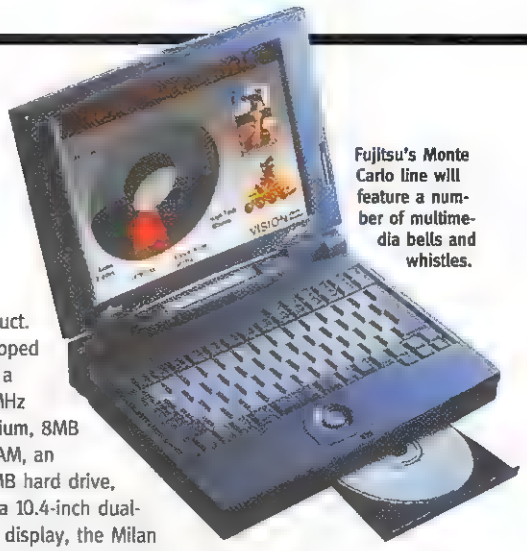
Fujitsu is mounting its first assault on the U.S. computer market with a new line of Pentium-powered notebook computers named after... famous European cities? Oh, give 'em a break. When was the last time you bought a car that had a name like the F3500-XMV?

The top-of-the-line Monte Carlo (priced from $3,199 to $5,199, depending on options) is designed for multimedia applications. Fujitsu differentiates this laptop from the pack by allowing you to install both a 3.5-inch floppy drive and a CD-ROM drive at the same time. Alternatively, you can remove the floppy drive and install a second lithium ion battery in its place to get up to a projected six hours of use. Another cool feature is the LCD status panel, which reports on battery life even when the notebook is closed.

Other than those tweaks, the Monte Carlo sounds like any number of other Pentium laptops. Processor speeds will range from 100MHz to 133MHz, with 256k of L2 cache, 8MB to 16MB of RAM, a 1GB hard drive, a 6x CD-ROM drive, stereo speakers, and a 12.1-inch active-matrix display. Fujitsu's own 28.8Kbps PC-card fax/modem is also included. Models with 8MB of factory RAM can be expanded to 40MB, and 16MB models to 48MB. The Monte Carlo will tip the scales at 7.3 pounds.

The 4.9-pound Montego is designed more for portability. Priced at $3,199, the Montego will feature a 100MHz Pentium, 8MB of RAM expandable to 40MB, and a 10.4-inch display. Like the Monte Carlo, the Montego's floppy drive can be replaced by a second battery. The machine will not include a CD-ROM drive, however, and it will have only one speaker.

Fujitsu describes the Milan line as its "value" product. Equipped with a 100MHz Pentium, 8MB of RAM, an 810MB hard drive, and a 10.4-inch dual-scan display, the Milan will sell for $2,199. When fully tricked out with a 133MHz Pentium, 16MB of RAM, 1GB hard drive, and an 11.3-inch active matrix display, the cost jumps to $3,999.



Fujitsu's Monte Carlo line will feature a number of multimedia bells and whistles.

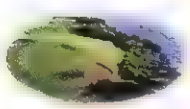
No doubt Fujitsu is looking for the tasty profit margins this market segment offers. With Hitachi jumping into the pond at the same time—and Compaq preparing to ship the first *consumer* laptop—fat margins might not be the norm for long. And that's great news for buyers.

— Michael Brown

AVAILABLE: **NOW**
PRICE: **$2,199 TO $5,199**
COMPANY: **FUJITSU PERSONAL COMPUTER CO.**
PHONE: **408.935.8800**
URL: **WWW.FUJITSU.COM**

NEW LINKS LS: TOUR WITH THE LEGENDS IN SPORTS

What's New About Links LS? Every Leaf, Every Contour, Every Chirp...



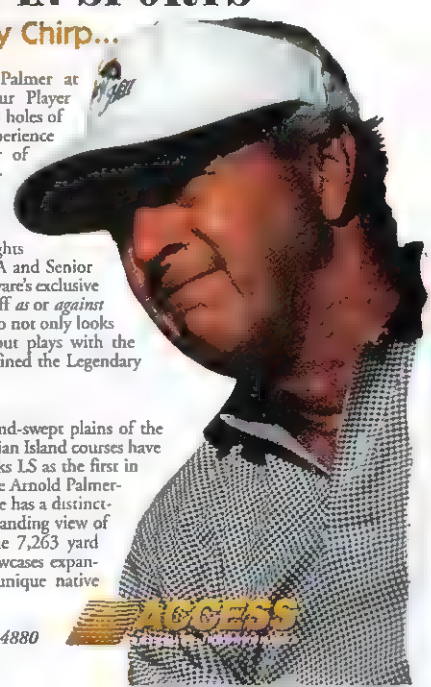
...Up to 16.7 Million Colors– New Links LS has unlimited screen resolutions and up to 16.7 million colors—resolution independent means that Links LS can match any monitor's maximum viewing capabilities (even 1600x1200 and higher) and up to 16.7 million colors means the finest in color quality possible. You've simply never seen any golf simulation software this good!

Features include new Post-Shot Reactions and Multiple Views!

...The Most Realistic Golf Simulation EVER– The totally new terrain rendering engine and ball flight give Links LS a realism never before achieved in the gaming industry. As Links has always done, we render not just the hole itself but the entire course and more—you literally can hit your ball a half-mile out of bounds! Now, authentic ground, sand, and grass textures combine with dynamic shadows and fog, to give you a course so lifelike you can almost feel the wet grass! Our engineers have reworked the ball dynamics giving you true-to-life ball flight. Fade your drive just like the pros or watch as your high arching wedge shot actually backs up on the green.

...Arnold Palmer– Arnold Palmer at Latrobe—the first in our Tour Player Series, delivers far more than 18 holes of golf. The Arnold Palmer experience includes a virtual reality tour of Arnie's workshop, office and trophy room. Roam freely in 360 degrees and examine the tools of the trade behind the legend. Listen to Mr. Palmer give insights and recollections about his PGA and Senior PGA tours through Access Software's exclusive multimedia footage. Then tee off *as* or *against* the digitized Arnold Palmer, who not only looks & sounds exactly like Arnie, but plays with the same style and tenacity that defined the Legendary Grand Master of Golf

...Kapalua– Resting on the wind-swept plains of the Golf Coast, two glorious Hawaiian Island courses have been selected to inaugurate Links LS as the first in the series of Resort Courses. The Arnold Palmer-designed Kapalua Village Course has a distinctly European flavor and a commanding view of the West Maui mountains. The 7,263 yard Kapalua Plantation Course showcases expansive slopes, deep valleys and unique native vegetation.



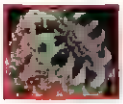
For more info, call 1-800-800-4880

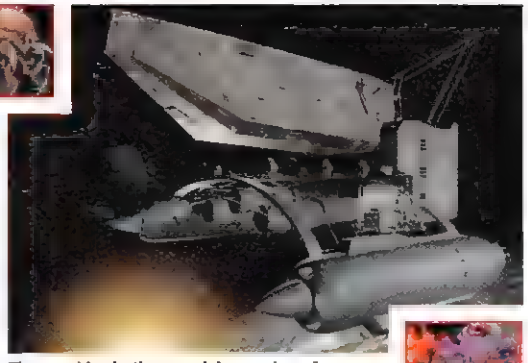
ACCESS

S/W

StarCraft

Sci-fi spin on this year's biggest game





The graphics in the pre-alpha version of *StarCraft* are reminiscent of those in *WarCraft II*. Blizzard is reworking the graphics, however, to match the quality in this conceptual image .

Be warned: *StarCraft* is on its way. It's the sci-fi variant of its medieval cousin *War Craft II: Tides of Darkness*, which has caused more domestic squabbles than any other game (with the possible exception of *Monday Night Football*).

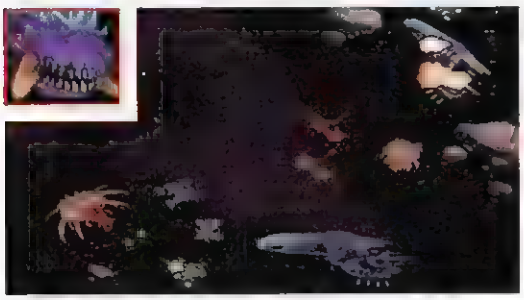
Aside from being set in outer space, *StarCraft* has a number of improvements over its earthly predecessor. "It's different in that it evolves at different times," says Bill Roper, director of third party development at Blizzard Entertainment. "If you play through each of the species in order, a huge epic unfolds."

There are three species: the humanoid Terrans, the biological alien Zurgs, and the technologically advanced Protos. Each species is being rendered with fluid movement modeling that takes into account physics and provides for a more realistic feel. And, of course, each race has its own special strategies and strengths.

Like its predecessor, *StarCraft*'s real buzz should be found in multiplayer games. Up to eight players can compete over a LAN or via Blizzard's own Internet-based gaming service, battle.net, which will be offered free to *StarCraft* owners.

In alpha, *StarCraft* had 30 different missions and is likely to have as many as 40 when it is released late this fall. Perhaps by then, we'll all be over *WarCraft II* and ready for a new favorite.

— *Doug Lombardi*



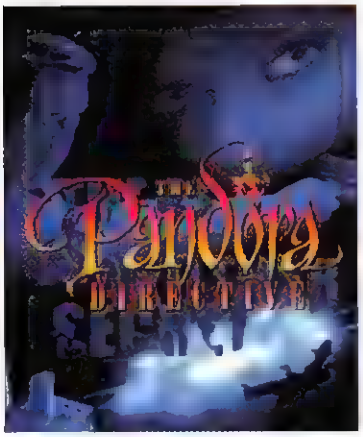
StarCraft is just one of the games to be featured on Blizzard's upcoming battle.net Internet gaming service.

AVAILABLE: WINTER 1996
PRICE: $50 (ESTIMATED)
COMPANY: BLIZZARD ENTERTAINMENT
PHONE: 800.953.7669
URL: WWW.BLIZZARD.COM

2 LEVELS OF PLAY · 3 NARRATIVE PATHS · 7 DIFFERENT ENDINGS · The Pandora Directive · 23 UNIQUE CHARACTERS · 58 PLAYABLE ROOMS · 360 DEGREES OF FREEDOM

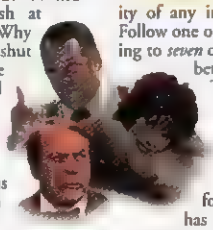
THE PANDORA DIRECTIVE: PLAY IT AGAIN, AND AGAIN...

Tex Murphy returns in the most replayable interactive movie ever made!

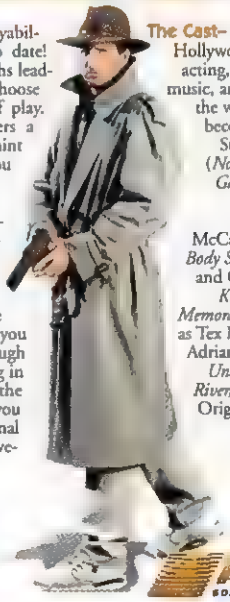


An Enormous Six-CD Cinematic Epic!

The Story– What is the truth behind the rumored UFO crash at Roswell, New Mexico? Why did the military suddenly shut down and seal off the Roswell complex? And why the frequent references to the lost Mayan civilization? It starts out like a hundred other cases. $500 a day (plus expenses) to track down a missing person. As you pick up Thomas Malloy's trail, you realize you're not the only one looking for him. By the time you discover that he's ex-military and knows what really happened on July 6, 1947, it's too late. The government's biggest secret is loose and you're trapped in a deadly game of cat and mouse with the most powerful and ruthless agency in the world. Based on the novel by Aaron Conners.

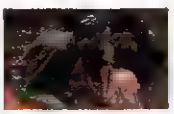
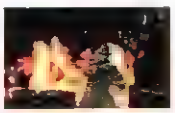


The Features– The most replayability of any interactive movie to date! Follow one of *three* narrative paths leading to *seven* different endings. Choose between *two* levels of play. The first level offers a complete on-line hint system to help you through the tougher puzzles. The second level—for expert gamers—has no hints available, but rewards players with higher bonus points, extra puzzles and locations. Our unique "Virtual World" engine allows you to slip under desks, rifle through drawers, and see the flies tanning in the light fixtures. Without the restrictions of rendered paths, you can explore Tex's three-dimensional world with full freedom of movement.



The Cast– Enjoy the difference Hollywood cinematography, acting, editing, stunt work, music, and direction make as the world of Tex Murphy becomes amazingly real. Starring Barry Corbin (*Northern Exposure, War Games*), Tanya Roberts (*View to a Kill, Beastmaster*), Kevin McCarthy (*Invasion of the Body Snatchers, Just Cause*), and Chris Jones (*Under a Killing Moon, Martian Memorandum, Mean Streets*) as Tex Murphy. Directed by Adrian Carr (*Quigly Down Under, Man from Snowy River, The Power Rangers*). Original music by Richie Havens and Nicole Tindall.

For more info, call 1-800-800-4880

ACCESS SOFTWARE INCORPORATED

Product Information Number 81

S/W

SimCopter

Think of it as a 3D browser for SimCity... with a mission

***SimCopter* features a variety of different urban missions set in your very own *SimCity* (and those provided with *SimCopter*), such as aerial firefighting. Somebody must have skimped on fire department funding.**

We talked to ***Will Wright****, cofounder of Maxis, creator of* SimCity*, and head game designer, about* SimCopter*, his latest contribution to the mania that is* SimCity*.*

boot: First off, Will, what's *SimCopter* like?

Wright: Well, you're flying a helicopter and doing a lot of urban rescue missions, things like putting out fires, or rescuing people, or chasing criminals, or doing medivac. So it's a mission-oriented civilian flight simulator, plus you can actually import cities from *SimCity* so you fly around the cities that you've built in 3D.

boot: How did you come up with the idea for *SimCopter*?

Wright: We had always tossed around the idea of a 3D *SimCity*, a more immersive 3D environment. I thought, well, how would I like to experience my SimCities in 3D? It came down to: I'd like to have a helicopter to fly around in. Helicopters have always fascinated me. They're so unlikely. I heard a funny quote once, "A helicopter is a very loose collection of very dissimilar parts flying in close formation." It's just amazing that they work at all.

boot: Who are you gearing the title toward?

Wright: People who like *SimCity*, and are intrigued by the idea of flying around it in 3D, could just ignore the mission and load in cities and use *SimCopter* as a 3D browser. At the same time, I'm trying to attract people who are normally into 3D flight sim games. Maybe they'll play this and want to buy *SimCity* as a game editor. Both games are very true gaming experiences. You create this thing in one game, and then have a very different experience with the same data in the other game. You import your city, it'll actually look at a profile of your city, the crime and whatnot, and the missions you get will be based on what you were doing badly in *SimCity*. It's going to ship with quite a few prebuilt cities as the levels that you advance through in the career game. So you'll start with a very small city and once you've accomplished enough missions, you'll graduate to the next level city, and the missions will get harder and happen a lot more often.

Effects such as fog can be pulled in for slower machines and pushed out for faster processors, effectively reducing background rendering to maintain smooth frame rates.

boot: What are some of the title's standout features?

Wright: We had to simulate an entire city at a much more granular level of detail so you could actually fly down, land on the street, get out and walk around. To take *SimCity*, this sort of stand back, abstract thing, with little blocks for buildings, and all of a sudden we're down on the street level watching people walk by and cars stop at crosswalks. That's been fun for me.

boot: It sounds incredibly ambitious from a programming standpoint.

Wright: It is, but we're actually leaning on a couple of other games that are using similar technologies, so some of the code that we're using, like for instance, to simulate the people, is actually coming out in another game. It's only in development. It doesn't even have a title now. But it involves people walking around.

boot: That sounds like a pretty exciting game.

Wright: [laughs] Yeah! *SimPeople walking around* game.

boot: Does the game sport any online or multiplayer connections?

Wright: No. It would be really fun if you were all playing in the same city and the city was on the server; and we are doing a *SimCity* multiplayer online, so the possibility is there. It really is more a matter of timing: Can we make Christmas with it? Probably not.

boot: Does the game support any special controllers?

Wright: We're using DirectInput from Microsoft, so just about everything should be supported to some degree. And we're allowing the user to remap all the controls however they want. So if you have a fancy joystick with 48 buttons, you should be able to map most of the game functions into it.

boot: Forty-eight buttons? I think that's called a "keyboard."

Wright: [laughs] Yes!

boot: How about 3D graphics cards?

Wright: We're looking at plugging in the Direct3D API at bottom level, which would then support some

cards. However we've been doing internal testing, and the results have been really disappointing. We're talking nowhere near a factor of two times up, more like 20 to 30 percent when you look at the overall throughput. It looks to me like it's a much more likely proposition that we'll all be upgrading to P6s, running three times faster on that P6, before these 3D cards catch up. I'm hoping they get the stuff sorted out, but right now it's not happening as fast as everyone would've expected a year ago. As it is, we're simulating so much of the city and cars and whatnot that our rendering engine is only taking about maybe 35 percent or 45 percent of the time. So even if we double our entire rendering engine, it's only going to make the actual game maybe 35 or 25 percent faster. Most flight simulators have a fairly static environment that you're flying through, so most of the time is spent rendering. In ours, we have a pretty dynamic environment going on underneath you.

boot: Will the city evolve as you're flying around?
Wright: The buildings won't. Because the time scale is so radically different you won't see buildings popping up or down, but there will be the traffic model running and, of course, things like fires will be simulated. Really, it's more destruction than creation. If you load in your own city, play around in it and things burn down, when you stop and save the file, you'll have to go back into *SimCity* and rebuild it.

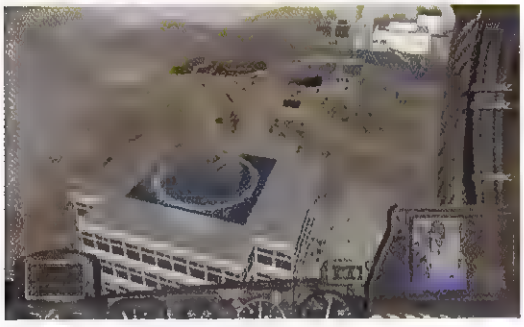
boot: What are the graphics like?
Wright: It's almost all polygon-based. We have special renderers for certain things and effects. Our people renderer is special. We wrote it because it wouldn't be fast enough to do with polygons, and special effects like fog and smoke and fire and stuff like that need special renderers.

boot: How does the new title handle sound?
Wright: Well I'm hoping to use 3D sound, although I can't really say for sure, but it's going to come down to CPU requirements. We're at the low level using DirectSound. The sampling rate is going to come down to performance tuning. The music is all WAV files. We're going to put an FM radio in the helicopter so you can select which radio station you want to listen to. Plus, you'll hear commercials and bulletins every now and then.

boot: What's the hook that will keep people playing?
Wright: *Tie Fighter* had this really nice blend of strategy and tactics. You could be great tactically, but if you didn't think strategically, you'd lose every time. So it has this cool learning curve, where you get the tactics down first, and then you start zooming out and looking at strategy. And that's exactly what I'm trying to get into this game. First you figure out how to fly the helicopter without crashing into the side of a building, then it's "how can I pick up a person?" or put out a fire. And then the next level is when five missions are coming in all at once. Certain missions, if you don't deal with them, will spawn other missions. So, if I don't put out a fire soon enough, I'll have people stranded on top of a burning building that I'll have to rescue. It's that learning curve, from incremental tactics up to grand strategy, that I want to hook the player with.

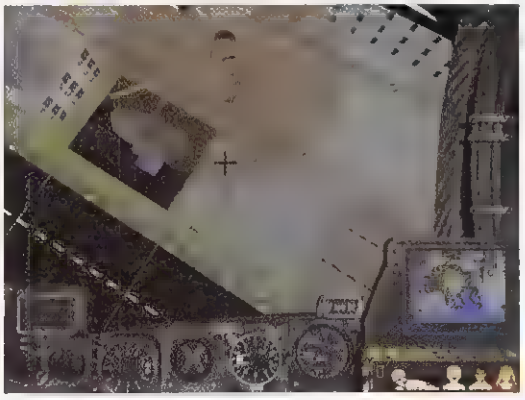
boot: What's your target release date?
Wright: All I can say is we better make Christmas. We're still programming. I'd call it an alpha right now. Really what it's lacking are all the missions. But the 3D engine is close to done and the interface is coming together very quickly.

"A helicopter is a very loose collection of very dissimilar parts flying in close formation."

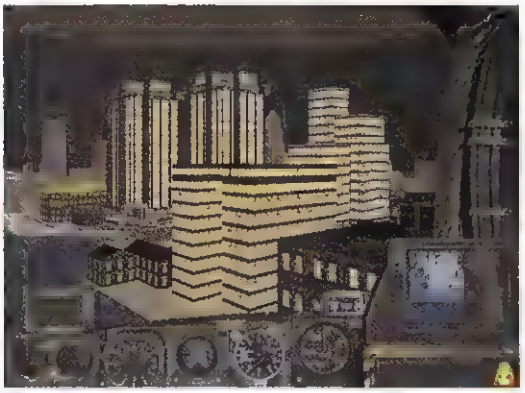


You must land on the roof of the hospital while performing medivac missions in *SimCopter*.

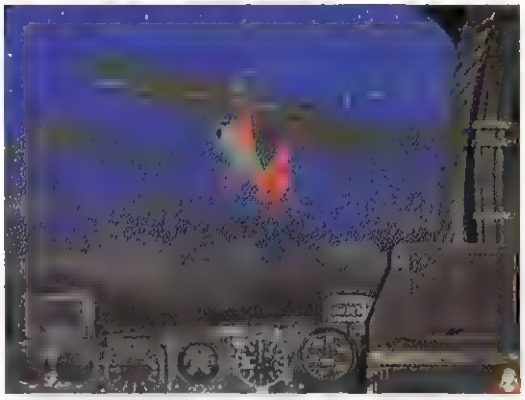
The barren area to the right is where your *SimCity* ends. You can fly over it, but the map is a globe, so flying off one end of the game field takes you back onto the opposite end.



SimCopter has three different views: cockpit, chase, and above. The above view is particularly useful for targeting water drops and for landing.



This is the first time you've ever been able to see the skyline of your grand *SimCity* metropolis at night. And in 3D too!



Breaking out above the cloud cover in *SimCopter* reveals the splendor of the night sky.

AVAILABLE: CHRISTMAS '98
PRICE: TBA
COMPANY: MAXIS
PHONE: 800.336.2947
URL: WWW.MAXIS.COM/PRODUCTS/SIMCOPTER

S/W

Drowned God

The truth is out there

Inscape's game explores the theory that God is an alien.

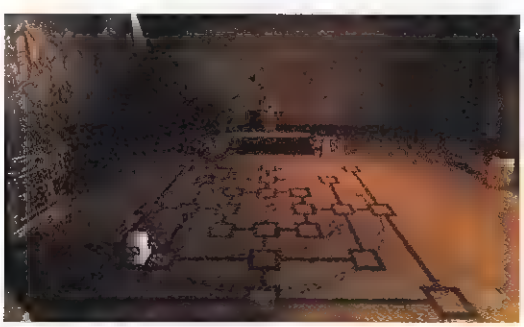
Do you believe that humans are the product of extraterrestrial genetic experiments? Are you convinced the carvings on the Plains of Nazca are navigation beacons for alien spacecraft? Then you're going to love Inscape's *Drowned God.*

The object of the game is to search four mysterious realms to find four ancient relics: the Ark of the Covenant, the Holy Grail, the Rod of Osiris, and the Philosopher's Stone. Each relic is guarded by a labyrinth of puzzles related to a 50,000-year-old conspiracy to obscure the true origin of the human race.

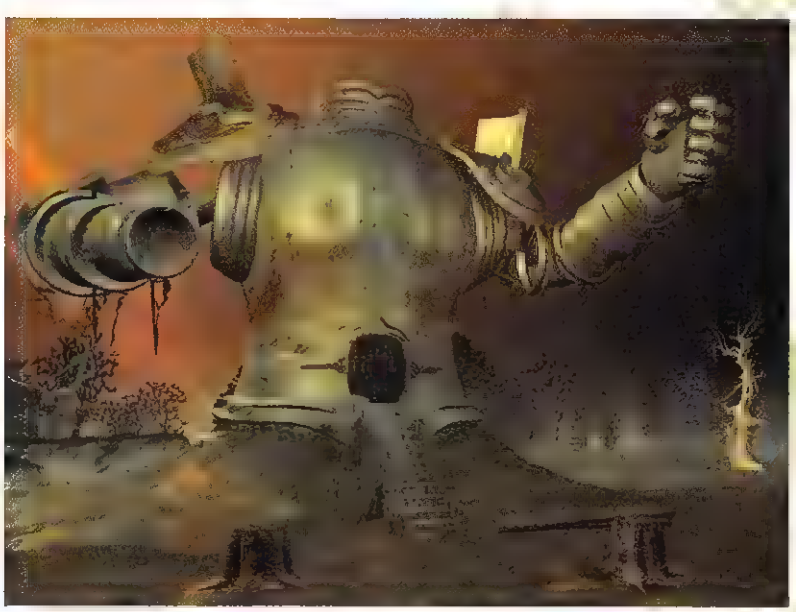
"The relics you're searching for are not what you think they are," says British designer Richard Horne. "The Rod of Osiris, for example, is said to be capable of turning water into fire. We recognize that as being a powerful catalytic converter that can turn sea water into fuel. It is a tool left behind by ancient alien visitors, and whoever possesses it could change the balance of power."

Drowned God will feature a number of puzzles, but the game's environment won't be a sterile, unpeopled world in the tradition of *Myst.* Artists are developing 15 human and alien characters, including representations of famous thinkers such as Isaac Newton and Albert Einstein, who will reveal how the true history of the world has been suppressed.

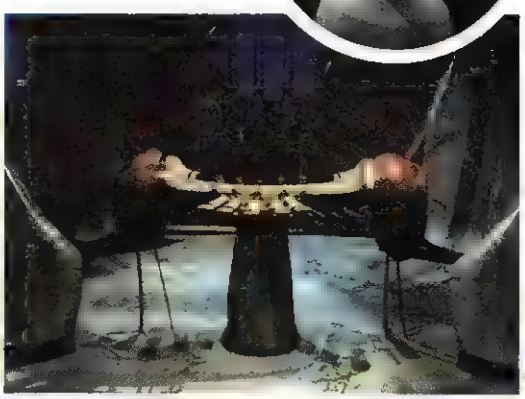
The game's title is drawn from one of the legends central to the game's plot, according to Horne. "It's almost a pun on the lost continent of Atlantis," he says. "The Book of Genesis describes Atlantis as being the home of the sons of God. The god in the title is the Egyptian god Osiris. Osiris' brother, Set, sealed him in a casket and put him out to sea to drown."



Drowned God **will feature fiendish logic puzzles that are tightly woven into the game's storyline.**



Artists are using Microsoft's *Softimage* to produce a surreal environment for *Drowned God.*



Some puzzles will be musically oriented. The game will feature a soundtrack by the British ambient band Miasma.

> "The relics you're searching for are not what you think they are."

Horne is a bit of a puzzle himself. It's difficult to tell whether he believes in these legends, or if he's just having a laugh. He hands out business cards, for example, that identify him as Harry Horse. He says he took on the assumed name because of a scam he pulled in 1983.

Writing under the name Enroh Drachir (Richard Horne spelled backward), Horne produced a 12-volume set of books chronicling the history of Atlantis. He aged the books to resemble 19th-century manuscripts and then sold them to an Edinburgh antique dealer. The dealer, according to Horne, decided they were the work of a minor poet and Dickens contemporary—who also happened to be named Richard Horne.

The modern Horne did nothing to correct this assumption, but his artifice was exposed when the dealer resold the books to Christy's auction house. "I was caught out," he says. "But because I was only 23, and because the antique dealer hadn't paid me an outrageous sum of money, he decided to hide his shame by not going to the police."

Had the antique dealer been more vengeful, *Drowned God* might never have been conceived. As it stands, the game should be available by year's end—unless the secret society of the Freemasons suppresses its publication.

— *Michael Brown*

Embark on a quest for ancient relics such as the Holy Grail.

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S/W

Unreal

Pushing the envelope on all sides

Intel has yet to announce a processor featuring its new MMX instruction set, but Epic MegaGames is already developing a game that promises to take full advantage of it. *Unreal*, a 3D, first-person action game, will deliver high-resolution, 24-bit graphics, frame rates of 30fps, and sound effects boasting 44.1kHz sampling rates.

Even without MMX, the game is poised to break new ground in terms of its capabilities and performance. "*Unreal* promises fully texture-mapped polygons with dynamic lighting and shadowing, even on a Pentium 90 with no 3D acceleration," says Cliff Bleszinski, *Unreal*'s chief developer.

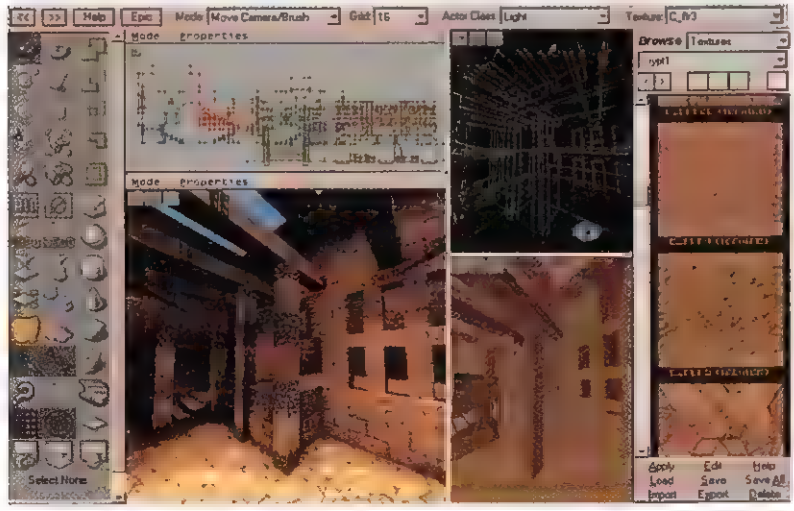
***Unreal* will feature awe-inspiring texture maps and lighting effects.**

In a major departure from other action games, you'll play a female protagonist, the lone survivor of a crash landing on an alien world. But don't worry. You won't be trapped in scenarios where you play house with alien space bunnies. Epic promises 40 different characters, including an impressive collection of big alien bad-asses.

"Combat will be extremely cinematic and consistently exciting," says Bleszinski. The game engine, he points out, will enable characters to react to bullets and other projectiles much more realistically than in previous games in this genre. "If you shoot somebody in the shoulder," says Bleszinski, "you'll see his shoulder jerk back when the bullet hits. And even after he's dead, his body will keep jerking if you keep shooting."

Feeling ambitious? Epic plans to bundle a level editor (*Unreal World Editor*), so you can design custom environments. You'll be able to trade any object you build with any other *Unreal* player, and they can instantly import that object into their version of the game. Use building blocks ranging from wooden staircases to castle walls to build new rooms, structures, and entire worlds in which to play. It's been possible to design your own *Doom* WAD files for some time, of course, but doing so required a set of arcane skills. The CAD-like *Unreal World Editor*, on the other hand, is the same tool that Bleszinski and his colleagues are using to create the levels in the original game. And Epic claims it's as easy to use as any graphics program.

There are more killer features. If you've ever craved switching sides to walk a mile in a monster's shoes, *Unreal*'s "possession" feature will give you the chance. Unleash this spell on an unwary opponent or any other character and you can temporarily inhabit and control his body, assuming whatever powers and weapons he happens to possess.



Using the CAD-like *Unreal World Editor* you can build custom game levels. A collection of utilities will empower anyone to host tournaments.

Multiplayer tournaments played over the Internet bring a totally new dimension to any game, but the fees that service providers such as DWANGO and TEN charge for play can put a major dent in your wallet. The alternative—playing over your employer's LAN—is just not feasible for most people. Epic promises to deliver a server edition of *Unreal* that will empower *anyone* to host multiplayer sessions over the Internet using nothing more than their home computer and a modem. Game hosts will be like dungeon masters, with the ability to control which monsters are present in a given environment, which rooms and buildings are accessible at a given time of day—even lighting and weather conditions.

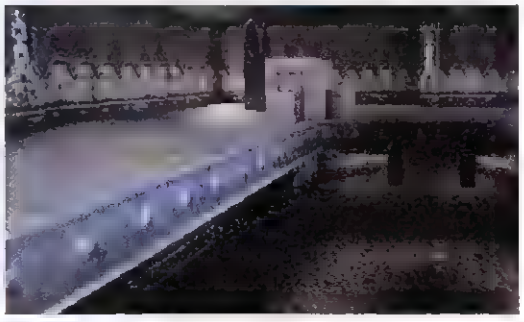
Intel's MMX technology will make possible some of the most realistic monsters ever seen in a computer game.

> "*Unreal* promises fully texture-mapped polygons with dynamic lighting and shadowing, even on a Pentium 90 with no 3D acceleration."

Assuming Epic can deliver on all its promises, when someone asks (and you know they will), "Why do you need a faster computer just to play games?" You'll be able to point to *Unreal* and answer "*This* is why."

— Lisa Rein

AVAILABLE: DECEMBER 1998
PRICE: TBA
COMPANY: EPIC MEGAGAMES
PHONE: 301.983.9771
URL: WWW.EPICGAMES.COM



***Unreal* will provide an immense gameplay universe.**

S/W

NBA Full Court Press

"Bill Gates with... the runner"

Bill Gates is no Hersey Hawkins, but he does know computers and what computer enthusiasts want: great games. NBA Full Court Press *is Microsoft's first sports sim. In fact, it's one of the first games from the software giant's emerging games division.*

NBA, *which should ship this November, supports up to four players over a LAN or serial connection, and features a nontraditional viewing perspective.*

But it will take more than smooth moves and a few good players to compete with EA Sports' NBA Live '96 *or Acclaim's* NBA Jam. *We spoke with Rob Wolf, product planner for Microsoft's sports games division, to find out if this title could compete with those winners or if it would take a seat on the bench with bricks such as Digital Pictures'* Slam City.

boot: The viewing angle and graphics in *NBA Full Court Press* are quite different. What do these features add to the game?
Wolf: We wanted the player to be able to see a lot. But we also wanted to make sure the gameplay was good. We have several different levels of resolution for that angle up to 1280x1024. There is also a zoom-in mode, so you can see things more clearly with the press of a key.

boot: Is this title geared to the hard-core sim fan, or is it targeted to the novice gamer?
Wolf: We tried to make it deep enough for the hard-core gamers. We also tried to make it approachable for novices and to those who have had bad experiences installing games. There's a help section that includes a glossary on the game of basketball.

boot: Have you included any team-editor modes or other features to give the game more replay value?
Wolf: We've got ways to change the players' characteristics, like facial hair, in the player editor. You can also create new players. So you could add yourself to the game. There are four custom teams that can be edited to your liking. There are over 250 different motions that were captured for the game via motion capture. That adds a good variety of movement, and you'll see something you haven't seen before after playing for a while.

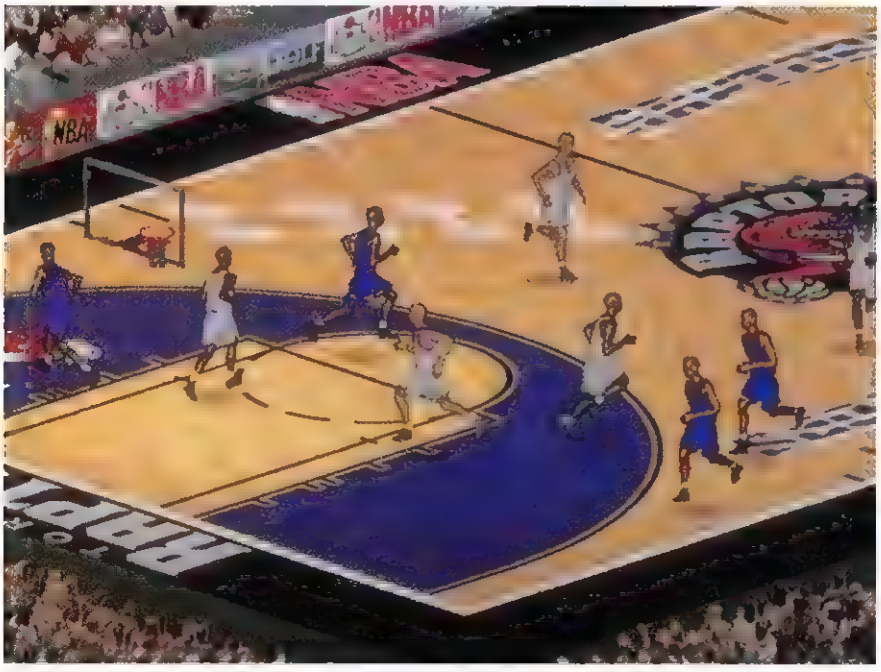
boot: What are some of the title's other standout features?
Wolf: One of the things I like about it is the fact that it captures the competitive spirit of sports. I think that is something people enjoy. Being able to sit next to your friend, dunk on him, and give him grief for it is fun. If you're playing over a modem it's a similar feeling. The A/I is also something that we really worked hard on. We worked with a scout from the NBA so that the teams would run real plays. We have over 100 plays that can be called out on the fly. Each team has five exclusive plays.

Another thing that stands out is the sound and the voice of Kevin Calabro [the radio and television voice of the Seattle Supersonics]. Using a real-life announcer is a feature that has been tried in the past and turned out choppy. It's something that we tried to make more enjoyable for the users. One other thing. When we ran this through the simulator, it said the Bulls will win 4-2 (in the NBA Finals).

— Doug Lombardi

The game features a player editor that allows you to add yourself, or Bill Gates, to any team. And there are four fictitious teams that you can edit.

Each team has exclusive plays based on the real life NBA squads. Teams' strengths and weaknesses are based on their NBA counterparts.



NBA Full Court Press **supports four players over a LAN or serial connection. Microsoft decided against any support for Internet play due to the unresolved latency issues.**

AVAILABLE: NOVEMBER 1996
PRICE: $44.95
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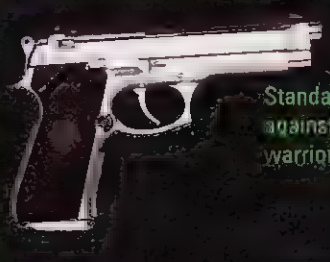

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S/W

Syn Factor

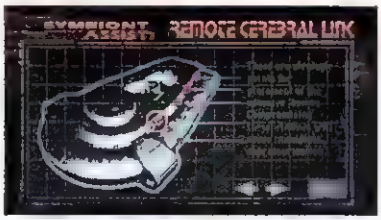
It's a beautiful world

We live in a world full of distractions, and the quiet moments of beauty are sometimes lost to the din. *Syn Factor* will most likely join those lost moments.

In this *Director*-based game, you are a crewperson aboard the I.S.T. Rident who awakes to find the rest of the crew and passengers mysteriously missing following a shanghai by two "dog ships." Your search for an explanation will take you through the beautifully rendered halls of the ship, through the memory banks of the ship's computer, and through the pages of PDAs you discover around the vessel. You are alone and don't know why.

I can tell you why. People are really hard to simulate in this style of game.

When the settings are so meticulously modeled and rendered, as they are in *Syn Factor*, inserting polygon people or cut-scene live action video (as is used in the fourth episode of the story, when you crash the Synsym corporate offices) is jarring and breaks the effect. The settings in *Syn Factor* are 640x480 stills presented in 256 colors and generated in *3D Studio*. You segue between stills with 640x480 QuickTime sequences that, once launched, are not interactive. You navigate the five episodes in this meticulous world via a rendered industrial interface with buttons for accessing your inventory, moving around the ship, and tapping into your personal databank, which you query for answers to your identity and circumstance. The action area is just over quarter-screen, but the angle of view is slightly wider than normal, and response time to clicks is quick enough that you don't suffer the annoyingly claustrophobic periscope effect.

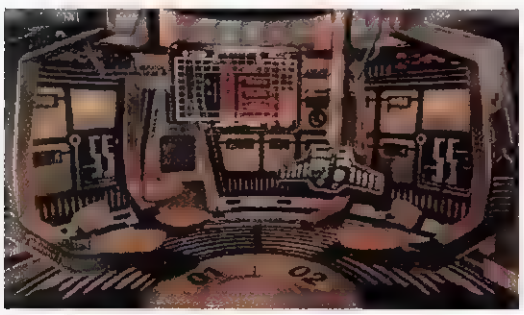


A screen from a PDA. In *Syn Factor*'s version of the future, everyone has Sym chip implants to help with that pesky man/machine interface.

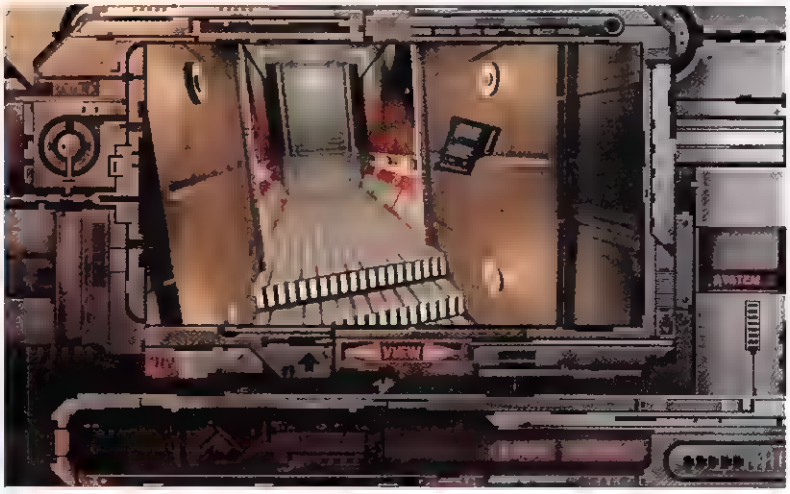
The biggest problem for *Syn Factor* is that the day for this genre of game has passed. As real-time texture-mapped, polygon-based games, such as *Quake* and *Unreal* refine their resolution and conquer technical issues such as light sourcing, games like *Syn Factor* feel more and more canned. This type of game has more in common with a paper-bound novel than the twitch games that are popular today. Comparing the adrenaline rush of unleashing hails of shotgun shells in *Duke Nukem 3D* to the quiet hunt-and-click format of *Syn Factor* makes the differences clear. The latter is as sexy as hunting for your lost car keys when you're late for work and suffering from a bad case of amnesia. Who am I? Where am I? How do I get out of here? Oh, there's a door. Access denied, pass key required. Where's that key? Hunt, hunt, hunt.

Still, if you have a quiet corner for your PC and some quality time to spend with it, *Syn Factor* can become as engrossing as a good book... if that's your speed.

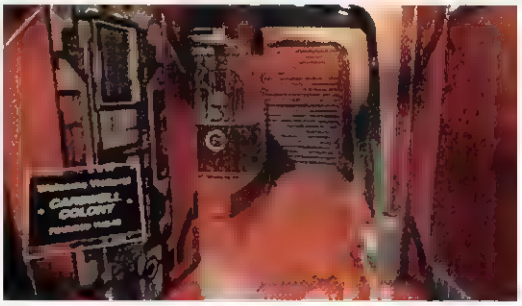
— Brad Dosland



Clicking on different controls in this shuttle brings up close-up views of the screens.



You navigate the stunningly rendered world of *Syn Factor* via this brushed metal interface looking for answers. Perhaps that floating PDA has a clue.



The third episode of *Syn Factor* takes place at the Carswell Colony, an unusual outpost that remains uncharted. And unpopulated as well. Just like the I.S.T. Rident. Spooky.

In this splash screen from the first episode, the weather starts getting rough, and the tiny ship is tossed. If not for the courage of the fearless crew, the Rident will be lost.

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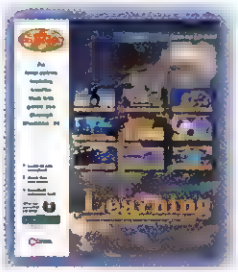

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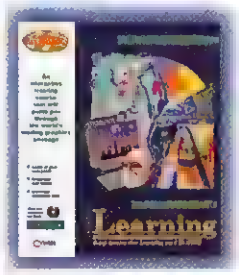

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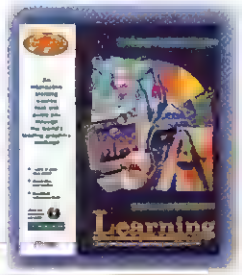

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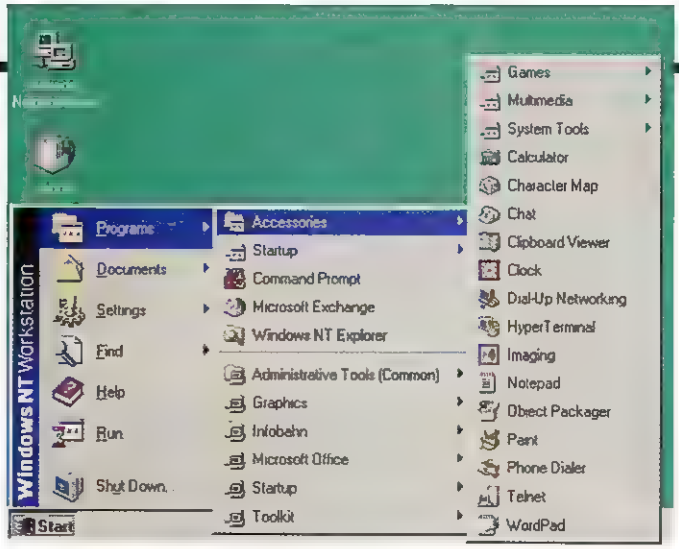
Product Information Number 91

Windows NT 4.0

A hands-on first look



You would be hard pressed to tell whether this machine is running Windows 95 or NT 4.0—except for a clue on the Start menu.

It's time to consider upgrading your operating system. You've upgraded your CPU, RAM, CD-ROM drive, hard drive, even your motherboard. But to leverage the most performance out of this hardware you must think about a transfusion for the digital lifeblood of your machine: The OS.

Windows NT is a die-hard network OS, but you wouldn't want to run the NT Server version on your personal computer. Instead, consider the workstation version of NT, which requires less hardware and offers better application performance. The NT Workstation version is known as a world-class personal computer OS, if you have the power and support to make the most of it.

Windows NT 4.0 was recently given a green light to enter beta testing, despite some reservations that it would delay NT's successor, the Cairo OS, which is being coded from the ground up as a *true* object-oriented operating system. As it stands, relatively few Cairo technologies, such as the Object File System, made it into NT 4.0. In fact, the robust "New Technology" of NT 4.0 is, by and large, just Windows 3.51 with the Windows 95 interface, some new tools, and a few new features, such as Plug-and-Play support (but only for PC Cards). Other than the wholesale adoption of the new GUI, this is not a major upgrade.

Some may quibble with the implementation of the Explorer user interface glued over NT's updated code, but it's certainly the most visible and the single best addition to NT 4.0. While veteran NT users may be annoyed after hitting the close box for the nth time when reaching for the maximize button, the interface is a result of both independent testing and Microsoft's own usability research (which shows that a system's power is more accessible to more users with the GUI, and, coincidentally, reduces the tech support burden).

In many ways, using NT 4.0 feels just like using Win 95. NT 4.0 even supports the new breed of DirectX-based games (such as *Zork Nemesis*), The Microsoft Network, and Internet access via dial-up networking. But ultimately the resemblance is only skin-deep—one look at the NT 4.0 Control Panel options makes this clear.

One jarring dissimilarity springs up when you go to install NT 4.0. Even for a hard-core PC mechanic, it can be a real bear to install and configure, partially because it lacks a centralized device manager with true Plug-and-Play support. PC Card Plug-and-Play has been provided for business people with laptops, but NT 4.0's lack of power management hobbles the OS on the road. A portable owner whose battery normally provides juice for four hours will be lucky to get one hour out of the same machine on NT 4.0.

One major issue when installing NT 4.0 involves updating all your device drivers. Because a computer system is worthless without full access to all your devices and peripherals, your choice of NT 4.0 vs. Win 95 may rely upon your ability to track down vendor-specific drivers for your hardware. While you should use true 32-bit Win 95 driver software to get the most out of it, Win 95 does support most DOS and Windows 3.x drivers. NT gives you no choice—you *must* install NT drivers for all your equipment, and NT

Windows NT 4.0

Windows 95

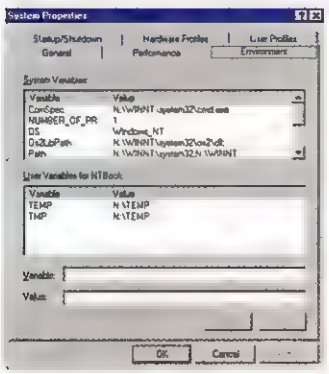
While many Control Panel icons appear similar to those found in Win 95, NT has many more Control Panel options, and many behave differently than their Win 95 counterparts.

Windows NT 4.0 at a Glance

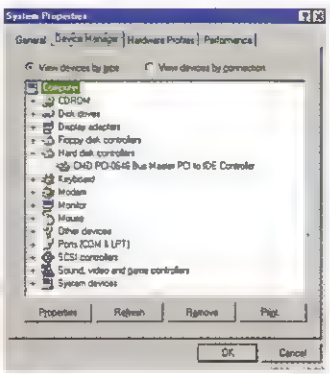
Note: Some features were introduced in earlier versions of NT, but are included here for comparison with Windows 95 and OS/2.

- Explorer user interface with desktop icons, folders, taskbar, and Start menu.
- New accessories, such as *Paint* and *WordPad*.
- Redesigned Control Panel tools.
- Many Microsoft *Plus!* features built in, including font smoothing, full-window dragging and sizing, TrueColor icons, even the pinball game.
- Faster display drivers, with support for dynamic resolution and color-depth switching, DirectDraw, DirectSound, and AutoPlay for fast and convenient gaming. Full OpenGL support for CAD and 3D graphics.
- Internet Explorer browser with ActiveX and Java support; dial-up networking; Exchange e-mail client included. TAPI support for communications and telephony applications. Peer-based Web server.
- Security features let you limit access to files and folders and system management functions.
- Requires 486 or Pentium processor–386 no longer supported (AMD/NexGen 586 and 5.25-inch floppy drives also not supported). NT also runs on MIPS, PowerPC, and Alpha CPUs.
- Per-file and per-folder dynamic compression, a big improvement over Doublespace and DriveSpace, which are not supported.
- Supports 16-bit FAT and NTFS partitions up to 8GB—no longer compatible with OS/2 HPFS partitions, and not yet compatible with the new 32-bit FAT for Win 95.
- True 32-bit pre-emptive multitasking with multiprocessor support and the ability to multitask 16-bit Windows applications in independent memory spaces.

Windows NT 4.0 System Properties



Windows 95 System Properties



4.0 is not compatible with most NT 3.x drivers, especially video card drivers. In fact, using an incompatible video driver is one of the few sure ways to completely bring NT 4.0 to its knees. "Real mode" DOS drivers and TSRs are also *verboten*, so forget about playing *Doom II*, or any other DOS-based apps, through NT 4.0.

Fortunately, NT 4.0 comes with drivers for most popular video cards, printers, SCSI adapters, and other peripherals. And since future versions of Win 95 and NT will rely upon identical driver models, a bigger selection of improved drivers should surface soon.

Once you have your NT 4.0 machine standing on its own two feet, try introducing it to a network or the Internet. Be prepared for a daunting deluge of jargon involving protocols, DNS and WINS servers, bindings, and IP addresses—and all this happens the first time you set up NT before you've digested the documentation, much of which is on the CD-ROM.

Windows NT is worth the trouble, however. For one thing, it's nearly crash-proof—if an application goes down, any other applications running in the background continue to hum along. There's no risk of losing data from one app when another app, running in the background, crashes. Win 95 has feigned this sort of stability with its alt+ctrl+del Close Program box, but NT actually delivers.

Of course, all this relies on efficient multitasking. NT's multitasking is a dream come true because 16-bit apps can run in separate virtual machines that multitask smoothly, and NT's true 32-bit nature makes your 32-bit applications run at top speed.

If you have a Pentium Pro, Windows NT is an absolute must—the fragments of 16-bit code in the Win 95 OS simply ruin the optimizations that the Pentium Pro employs—NT finally unleashes the full power of this CPU. Given Windows NT 4.0's superior multitasking, rock-solid stability, and friendly interface, the same could be said for any PC running NT 4.0.

Given all the DOS-based games and the deluge of Win 95-optimized software available, perhaps the best solution for power users who want the best of both worlds is a compromise.

Install both Windows NT and Win 95, and when you boot up your machine it will ask you which OS you want to run. While most software (except 32-bit optimized code) will run about the same speed under either OS, NT 4.0's multitasking and stability will make you much more productive.

— *Charles Brannon*

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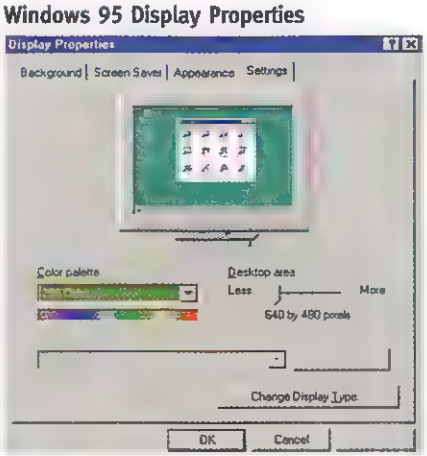
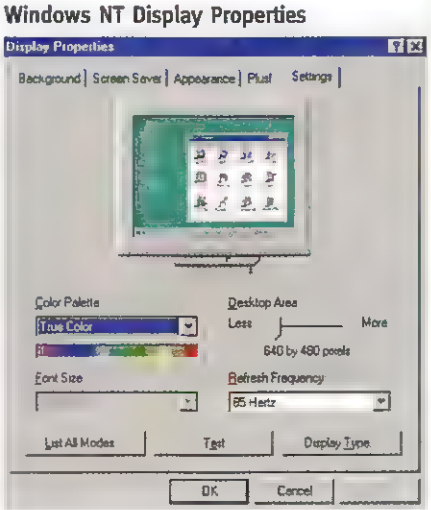
Windows 95 Display Properties



Windows NT Display Properties



A Brief History of Windows NT

Traditionally, Intel-based machines have employed some combination of MS-DOS and Windows 3.x, with a handful of power users opting for OS/2. The 1990 introduction of Windows NT 3.1 offered a powerful alternative, combining the reliable 32-bit multitasking power of OS/2 with the familiar Windows 3.1 interface and superior software compatibility.

For these reasons, Windows NT started primarily as a network operating system and a workstation-class operating system for engineers, professional designers, and anyone with zero tolerance for system crashes and resource limitations. While NT ran most 16-bit applications well, its reliance on a true 32-bit platform led to some compatibility problems and, surprisingly, reduced performance.

Windows NT did not catch on immediately. For one thing, it required (and still does require) a more powerful computer than Windows 3.1. When 4MB computers were considered well-endowed, NT required a minimum of 16MB. Indeed, as desktop configurations grew increasingly more powerful, Windows 3.1's limitations became painfully apparent.

The solution came with the long-awaited introduction of Windows 95, whose primary goal was compatibility with Windows 3.1 software, with secondary goals achieving better multitasking, support for 32-bit programs, and a completely updated user interface. Windows NT, on the other hand, continues its focus first on reliability and stability, with compatibility and performance as secondary goals.

Win 95 offers a lot for a desktop operating system: increased system resources, easy network configuration and management, built-in Internet support, and numerous new technologies such as TAPI, Plug-and-Play, DirectX, virtual disk access, not to mention extensive hardware and peripheral support. Despite these new features, Win 95 continues to support older programs and equipment by using an enhanced version of MS-DOS at boot time, with improved support for DOS games and applications, even without exiting Win 95.

Despite Win 95's rapid adoption in the home and small office, corporations have been holding out for the next generation of Windows NT, considering it more suitable for mission-critical applications. Larger companies can afford the hardware upgrades needed to run Windows NT. The thinking goes, if you have to upgrade your computers to run Win 95, why not pay just a little more and run Windows NT instead?

Charles Brannon, a freelance book author and contributing writer, is coauthor of Windows NT 4.0 Workstation Desktop Companion, *published by Ventana Press.*

boot reviews

KICKIN' THE TIRES ON THE LATEST **HARDWARE** AND TAKIN' THE NEWEST **SOFTWARE** OUT FOR A SPIN

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S/W

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106 Waterloo
110 Duke Nukem 3D
112 Web.Designer
112 Total Mayhem
115 3D Studio Max

ratings system

90 to 100% Dreamy The hardware you'll find in this category expands the realm of The Possible; the software breaks new ground and takes full advantage of the best hardware. If you care about computing, you must have this stuff.

80 to 89% Excellent The goods in this category don't push the envelope quite as hard, but they do offer excellent performance. Some of this stuff is esoteric enough that it holds only limited appeal.

70 to 79% Solid These are more than "me too" products. They fine-tune the use of new technology, rather than push the envelope.

60 to 69% Good If it lands here, it's average. Look around and you'll find several nearly identical competitors. In most instances, however, there is some feature that makes it worth a second look.

50 to 59% Fair These products are behind the performance curve and fail to take advantage of readily available technology that could make them much better.

40 to 49% Lacking Anything in this category exhibits serious flaws, but it has a few redeeming qualities.

0 to 39 % Dregs Flat-out junk. The management of any company that produces more than one of these in a single year should be sacked.

boot KICK-ASS! PRODUCT

Only the best earn enough respect to be worthy of our editors' choice award.

H/W

Gateway 2000 Solo

This light weight is no lightweight

With a 120MHz Pentium, 1.2GB hard drive, and 40MB of EDO DRAM inside, it might seem the Gateway 2000 Solo should possess the heft of a $5,599 boat anchor. But weighing in at just 6.3 pounds (including the 4x CD-ROM drive), this machine is ready to fly.

The Solo owes much of its weight loss to its diminutive lithium ion battery. Its 11.3-inch active-matrix display is also smaller than many other notebooks in its class, but it's incredibly bright and offers brilliant contrast. The Chips & Technologies 65545 chipset supports 800x600 resolution, but only at 256 colors. You must drop down to 640x480 to display 64,000 colors.

The computer's back panel offers serial, parallel, and VGA ports behind a flip-down panel. There's also an infrared comm port and a PS/2-style port for a mouse or keyboard. If you're looking for a machine that will double as a desktop computer, the Solo features a connector for an optional port replicator (which has, among other things, a MIDI/game port). The display will pivot to a completely horizontal position, ensuring it won't block out your CRT display. No matter what position the display is in, a 3.5-inch LCD keeps you informed of the status of up to 14 conditions, including disk access and battery status.

The battery can be charged while installed—even if you're using the computer—or it can be plugged directly into the AC adapter brick. A multicolor LED on the display hinge informs you of charging conditions even if the lid is closed.

Flip the computer over, and you'll notice how accessible all the Solo's components are. No tools are need to get at the SIMM sockets, and both the battery and hard disk drive pop right out. Spring-loaded feet on the back flip down and lean toward the front of the computer to give you a better typing angle. These mechanics make it impossible for the feet to collapse beneath the computer

under the hood

the brains

CPU.....120MHz Intel Pentium
External Cache.....256k pipeline burst
RAM.....40MB EDO DRAM (40MB max)
Video.....C&T 65545, 1MB 70ns DRAM

the brawn

Hard Drive.....1.2GB IBM DPRA 2121S, EIDE
CD-ROM.....Matsushita 4X, IDE/ATAPI(removable)
Expansion.....2 Type II PC Cards or 1 Type III

the beauty

Display.....11.3-inch active matrix
Video.....800x600 max res with 256 colors
Sound.....ESS ES1688 FM synth., 16-bit DAC, 16-bit ADC
Speakers.....stereo
Weight.....6.3 pounds w/CD-ROM drive

The Gateway 2000 Solo wraps a 120MHz Pentium, a 1.2GB hard drive, and a whopping 40MB of RAM into a 6.3-pound package.

when you pick it up and set it back down.

The Solo possesses a number of low-tech features that actually make the device easier to use. You adjust the display brightness, for example, with a slider on the right side of the display. Volume control is handled by a thumbwheel next to the line-out jack, and the CD-ROM drive tray can be ejected even when the power is turned off. Removing the Matsushita 4x CD-ROM drive to replace it with the floppy drive is a single-handed operation.

Less impressive is the Solo's mushy keyboard. Push down firmly on any key and the entire board caves in slightly. Several important keys, including the tab, delete, caps lock, shift, and space bar are unusually small. The cursor-control keys are ridiculously narrow. Gateway's trackpad, on the other hand, is an improvement over typical pads because it reacts to finger taps as though you had hit the left mouse button. This makes opening folders and conducting drag-and-drop operations considerably easier than with a trackball or stick.

The Solo racked up some impressive benchmarks in our tests. Ziff-Davis' WinBench 96 reported a Disk WinMark of 588KB/sec and a CD-ROM WinMark of 398KB/sec. The Solo earned a Graphics WinMark of 10.6 million pixels per second at 800x600 resolution with 256 colors.

Graphics performance in DOS was lackluster. At 320-x200 resolution, the Solo achieved just 26fps running *Descent II*, but sped up to 36.5fps in *Duke Nukem 3D*. With resolution cranked up to 640x480, performance slipped to just 8fps in *Descent* and 7fps in *Duke*.

Sound on the Gateway is surprisingly good, especially considering that the ESS ES1688 audio chipset offers only FM synthesis. Its 16-bit DAC also sounds good and relatively free from distortion—especially through headphones. You'll hear plenty of noise in the signal path while playing audio CDs, however. Stereo speakers are mounted on the lid hinge and face you directly for clear sound.

Considering this laptop boasts 40MB of RAM, it's amazingly inexpensive. With a bigger screen and a firmer keyboard, it would have been even better.

— Michael Brown

Double Take

I love this laptop (I prefer a keyboard with a responsive touch). The active-matrix display is crisp even outdoors, although I'd prefer a 12.1-inch screen. Plus, the Solo's PC Card slot and modular drives are easy to use and provide handy peripheral and communications options.

— Angela LoSasso

COMPANY: GATEWAY 2000
PRICE: $5,599
PHONE: 800.846.2000
URL: HTTP://WWW.GW2K.COM

boot verdict: 87%

All the multimedia you could want in a 6-pound package

Hitachi M-120T

Focus is on communications

Hitachi's first notebook computer features a number of bells and whistles and several innovations, but the machine also has a couple of key design flaws.

With a 120MHz Pentium, 16MB of RAM (expandable to 48MB), a spacious 11.8-inch active-matrix display, a removable 4x CD-ROM drive, and stereo speakers, the M-120T ($5,299) is a multimedia powerhouse. And the built-in 28.8 fax/modem and 10BaseT Ethernet port leaves the two Type II PC card slots completely free.

Unfortunately, the machine turns into a ravenous beast when running on battery power. Even after setting the supplied Phoenix *PowerPanel* utility for maximum life, the Hitachi consistently delivered a meager one and a half hours of uptime from its NiMH battery. What's worse, the only battery status indicator is a tiny LED that lights up a few minutes before the battery is exhausted (the machine emits a feeble beep at the same time). It's a good thing Hitachi supplies a stand-alone battery charger, because the computer won't charge its battery unless it's plugged in but powered off.

One of the M-120T's most significant innovations is the sliding hinge attached to its display (max resolution of 800x600 and up to 64,000 colors). When opened, the bottom of the panel slides forward so the lid stands perpendicular to the base. This is convenient for working in tight quarters, such as an airline seat, but the hinge consumes real estate that could otherwise have been used for an ergonomic wrist rest. The hinge also prevents the display from lying flat, so using this computer with a CRT display is problematic because the lid obstructs your view of the monitor. The lid is thin and not at all strong. Even light finger pressure on the back and sides causes the LCD display to bloom and distort.

Hitachi's M-120T notebook features a 120MHz Pentium. Remove the floppy drive and you can install a 4x CD-ROM drive. Need both? Plug the floppy into the parallel port.

Weight, on the other hand, is no problem. The M-120T tipped the scales at just 7 pounds, including the CD-ROM drive, battery, and built-in power supply (all you need is a cord; there's no power brick to pack).

The front drive bay accomodates either a removable 3.5-inch floppy disk drive or a CD-ROM drive. If you need both at the same time, plug the floppy into the parallel port. But if you extend the legs on the back of the unit, however, you won't be able to open the CD-ROM drive without jamming its tray into your desktop. Can't you just picture Hitachi's engineers exploding with a Homer Simpson-style "Doooh!" the first time they punched the CD eject button on a shipping unit?

In our performance tests, the M-120T delivered ▶120

under the hood

the brains

CPU	120MHz Intel Pentium
External Cache	256k L2
RAM	16MB EDO DRAM (48MB max)
Video	Cirrus Logic-7543 PCI, 1MB DRAM

the brawn

Hard Drive	1GB-IBM
CD-ROM	4x (removable)
Expansion	2 Type II PC Card or 1 Type III

the beauty

Display	11.8-inch active matrix
Video	800x600 max res, 64,000 colors
Sound	Sound Blaster Pro-compatible, FM synth
Speakers	Stereo
Weight	7.3 pounds w/CD-ROM drive
Communications	28.8Kbps modem/14.4Kbps fax; 10BaseT Ethernet, Infrared port
Other	Built-in AC adapter; 5-year warranty

Strife

Neither fish nor fowl

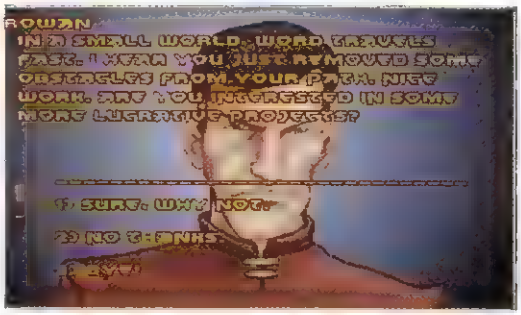
Strife takes the *Doom* game engine and enriches it with RPG-style play. But after tramping through the elegant, 640x480 universe of *Duke Nukem 3D*, it's damned hard to stuff your expectations back into *Doom*'s three-year-old, pixelated, 320x200 box—enriched or not.

If this were the only problem, you could almost forgive the game's visual flaws in appreciation of its ambitious nature. Unfortunately, *Strife*'s value as a role-playing game is severely compromised by the shoot-'em-up nature of its foundation. The linear *Doom* engine is simply too restrictive to accommodate the complex, branching storyline that a good RPG needs.

You can't go home again. The graphics of which the *Doom* engine is capable just aren't bootWorthy.

As a hero for hire, your mission is to help a group of rebels overthrow the government, which consists of a tyrannical cult known as The Order. (Yes, it does sound a lot like *Dark Forces*.) The difference is that *Strife* gives you the opportunity to interact with the other characters in the game, instead of simply blowing everybody away. You can also carry an inventory of objects and tools in addition to your cache of weapons and ammo.

Initiate conversations with any characters you encounter (peasants, prison guards, allies, your commanding officer, and so on) by pressing the space bar. Most people won't have much to say, but a few possess information or objects you require or have instructions for you to carry out. (The latter characters are represented by static, cartoon images, but have excellent voice-over narration.) This adds complexity to the game, but your "correct" response to what anyone has to say is usually so obvious that the game never builds up any suspense.


IN A SMALL WORLD. WORD TRAVELS
FAST. I MEAN YOU JUST REMOVED SOME
OBSTACLES FROM YOUR PATH. NICE
WORK. ARE YOU INTERESTED IN SOME
MORE LUCRATIVE PROJECTS?
1) SURE. WHY NOT.
2) NO THANKS

You interact with characters represented by static cartoon images, but they have excellent voice-overs.

Strife wants to be a thinking man's *Doom*. Just don't think too hard, or you will begin to ask yourself why you're playing this game.

— *Michael Brown*

PRICE: $49.95
COMPANY: VELOCITY
PHONE: 800.856.2489
URL: WWW.VELOCITY GAMES.COM

boot verdict: 65%

Interesting idea, not much payoff

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Okay, try to follow this... you've got your normal audio CD from top-selling artists and fresh new bands. Pretty straightforward. Now, take that same CD out of your stereo, cruise over to your Mac or PC and pop it in. Now you've entered a totally mind-blowing new dimension. You've got videos, interviews, photos, lyrics and more original stuff than you can possibly imagine! It's a gourmet's plate of music and software, plus music TV and more... all burned onto one disc.

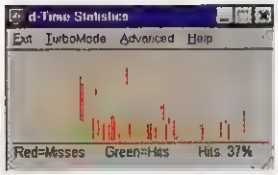
S/W

d-Time 95; SpeedyROM

Steak or ground sirloin?

Quarterdeck's *SpeedyROM* and Ballard Synergy's *d-Time 95* will both make your CD-ROM drive seem faster by caching data from the CD to your hard drive. The difference is that Ballard Synergy wants to grind your steak into a nice, easily digestible patty, while Quarterdeck says hey, have it your way.

Both programs use your hard drive as a massive cache for the CD-ROM drive; therefore, the performance boost you experience will be basically identical with either program. Configuring *d-Time 95*, however, left me with the impression that Ballard Synergy wanted to "save" me from having to deal with all the nasty complexities of the task.

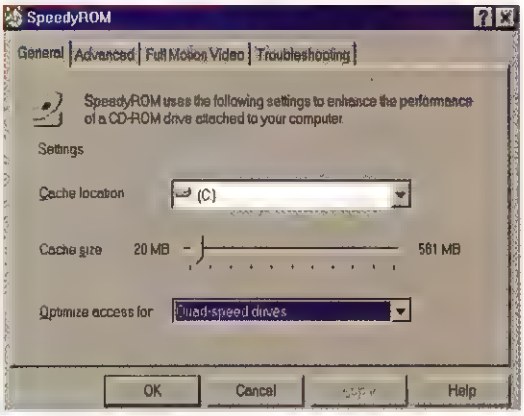


Ballard Synergy's *d-Time 95* offers several gee-whiz features, including this graph tracking cache hits and misses.

Here are a few examples: Both programs ignore full-motion video files by default, because caching them usually yields zero performance improvement. *SpeedyROM*, however, gives you the option of caching *small* digital video files. *d-Time 95* uses the same caching technique for all CD-ROM drives; *SpeedyROM* offers different settings for different drives, up to 8x. *d-Time 95* automatically defragments your hard drive, using the Defrag utility built into Windows 95; *SpeedyROM* recommends that you defrag your hard drive, but leaves the task—and the choice of which defrag utility to use—up to you. Lastly, *d-Time 95* won't function on a compressed hard drive; *SpeedyROM* will.

d-Time 95 does have one important advantage over the competition: It runs under both DOS *and* Windows 95. Given a choice between the two, I'd go with *SpeedyROM*. I prefer to cut my own steak, thank you.

— *Michael Brown*


SpeedyROM
General Advanced Full Motion Video Troubleshooting
SpeedyROM uses the following settings to enhance the performance of a CD-ROM drive attached to your computer.
Settings
Cache location (C)
Cache size 20 MB 561 MB
Optimize access for Quad-speed drives
OK Cancel Help

Quarterdeck's *SpeedyROM* offers a host of performance options.

PRICE: $50
COMPANY: BALLARD SYNERGY
PHONE: 800.754.1204
URL: WWW.BALLARDSYNERGY.COM

boot verdict: 75%
Keep it simple, stupid.

PRICE: $59.95
COMPANY: QUARTERDECK
PHONE: 800.354.3222
URL: WWW.QUARTERDECK.COM/

boot verdict: 80%
If you must, rake it thus.

And it won't eat into your gas money 'cause it's only a few $$ more than a regular CD and it's available at record and software stores everywhere. Look for current titles by Clay Walker • The Monkees • Soundgarden • Her Majesty the Baby • Three Penny Needle • TOE • and keep an eye out for more new alternative, rock and country titles throughout 1996!

Product Information Number 109

Our Website: http://www.numill.com

nu.millennia|inc.™

H/W

512k Pilot

PDA goes beyond pure lust

When I first saw the U.S. Robotics Pilot PDA, I thought it would be perfect for *boot*'s Pure Lust department. But having lived with the tiny powerhouse for a week, my feelings definitely go above and beyond lust. This is love.

Desktop systems are powerful, laptops are versatile, the Newton blows. The secret to a PDA is that it must be with you when you need it. At only 5.7 ounces and roughly the size of a pack of playing cards, the Pilot isn't a piece of luggage you constantly need to be aware of. It's just in your pocket. And of its 3x5-inch face plate, 2.4x3.2 inches are LCD screen, so it's only as big as it needs to be.

The touch-sensitive LCD screen has adjustable contrast that can be viewed in a variety of lighting conditions (a backlit screen would have been convenient, but a U.S. Robotics rep explained the option was left out to extend the two AAA battery life to the multimonth range). Input is accomplished by pressing the on-screen buttons and those built into the case, using the tucked-away stylus to negotiate the on-screen keyboard, scroll arrows and pull-down menus, and by the powerful handwriting recognition package called *Graffiti*. If you naturally print when you write (like me), *Graffiti* will take you all of three minutes to master. This definitely works.

The advantage of translating your notes is that the data you pour into your Pilot isn't trapped there. Just drop the Pilot into the provided cradle, which connects to your PC's serial port, hit the HotSync button, and Boom! All the info from your Pilot address book, date book, memo pad, and to-do list are automatically copied to the capable *Pilot Desktop* PIM software (and vice versa).

Besides these applications, some of the Pilot's 512k (or 256k with the $299 model) memory is occupied by a memory monitor that details memory consumption, and a security program that allows you to hide records classified as private, assign a password, and turn off and lock the unit so it cannot be turned on again without the password. A *Graffiti*-based game called *Giraffe* is included with the *Desktop* software, and downloading it to the Pilot is simplicity itself. U.S. Robotics promises more apps are coming, so look forward to the gamut of programs available on other PDAs in the near future.

Hopefully the next generation of Pilot apps will also contain the thoughtful details that abound in this package. Like a shortcuts feature that allows you to create a custom glossary of common abbreviations, such as writing just `dts` for a date and time stamp, or `br` for `breakfast`, or `pka` for `The Pilot PDA is a Kick Ass product.`

The Pilot PDA is the embodiment of modular design. The stylus slides into the top of the PDA for handy storage and the PDA drops into the cradle for automatic file synchronization via the serial port.

The Pilot PDA shown actual size.

You want proof? I wrote this entire review on a Pilot sitting on the sun-drenched deck of a sailboat in the middle of San Francisco Bay instead of going into the office today.

— *Brad Dosland*

boot KICK ASS! PRODUCT

PRICE: $369
COMPANY: U.S. ROBOTICS
PHONE: 415.949.9560
URL: WWW.USR.COM

boot verdict: 94%

Pocket the power

Psychologists say inside every 18 to 35-year-old male, there lies a potential psychotic killer.

H/W

boot KICK ASS! PRODUCT

WingMan Warrior

Now that's a spin cycle!

Once you've mastered your favorite first-person action game with Logitech's WingMan Warrior, you'll wonder how you ever survived playing with a primitive keyboard. This device does for action games what the conventional joystick did for flight sims.

Building on the foundation of its WingMan Extreme joystick, Logitech has designed a two-handed controller that offers unprecedented mastery of your character's actions without ever having to resort to using your keyboard or mouse. The Warrior isn't perfect, but it comes close.

The Warrior's biggest innovation is its Spin-Control. This silky-smooth, rubber-coated knob turns your character in a 360-degree circle. Used in conjunction with the fire button, you can spin like a top, spewing out ordinance like a lawn sprinkler. Used with the stick, you can even run circles around your opponent.

The Warrior's stick operates much like a conventional joystick, with four action buttons plus a four-way hat switch. The trigger (button 1) is a fire button, but the function of the other three—and the hat switch—depend on the game being played. In *Duke Nukem 3D*, for example, button 2 opens doors, button 3 toggles through your inventory, and button 4 uses an inventory item. The hat switch, meanwhile, controls your pitch (up and down) and allows you to crouch and jump. An analog thumbwheel beneath the SpinControl knob controls your run/walk speed in most games, but affects its sensitivity in a few others.

I found the Warrior highly ergonomic, with my fingers naturally falling into the appropriate positions. My biggest criticism is the placement of button 3, which is difficult to operate and too far away from the rest of the thumb-operated buttons and the hat. About the only state-of-the-art feature missing is support for Immersion's force feedback API.

Be prepared to spend some quality time mastering the Warrior's nuances; don't expect to destroy the universe the first time you jump on the stick. But once you have, you'll never go back to pounding a keyboard.

— *Michael Brown*

The SpinControl feature in Logitech's WingMan Warrior lets you run circles around your opponents.

PRICE: $99
COMPANY: LOGITECH
PHONE: 800.321.7717
URL: WWW.LOGITECH.COM

boot verdict: 95%

An innovative, flexible specialty product for true gamers

PC ProgramPad

You can't soar if you're sore

Having just missed growing up with video games, my hand/eye coordination is not what it could be. I'm not a *bad* player, but I didn't start training in preschool, either. My kids, on the other hand, evolved with games, and they have the enlarged thumbs and stubby fingernails to prove it. Whenever I muster the temerity to challenge them to a game—*Mortal Kombat*, for instance—they kick my ass (figuratively speaking, of course) with infuriating regularity.

I thought Interact's PC ProgramPad would be the answer. Instead of having to train my fingers into pulling off special moves, all I needed to do was program the keyboard (or button-firing) sequences into the pad itself. After an hour of furious play, I was holding my own against the kids, but the pad's ergonomics had my hands curled into gnarled claws. If you like the Super Nintendo game pad, on the other hand, this one will be right up your alley.

Instead of punching the forward key twice, the down key twice, the forward key again, and then the low-punch key to have Sheeva let loose one of her deadly fireballs in *Mortal Kombat*, you need only store the move into one of the pad's six open memory slots. Thirty additional moves, for games ranging from *Primal Rage* to *Super Street Fighter II* are already stored.

A digital, eight-way, directional thumb pad is mounted on the left of the pad, and four fire buttons are mounted on the right. Two additional fire buttons are located on the top of the controller and are operated by your left and right index fingers. Three additional direction keys arranged around the four fire buttons make it easy to pull off strafing and sidestepping moves.

An LCD in the middle of the controller displays which mode the device is in and lights up when the buttons are pressed. This feature makes programming the pad a snap. The ProgramPad is great, if your hands are small enough to manipulate it; otherwise, you'll have to limit your game time to avoid cramps.

— *Michael Brown*

The PC ProgramPad is preprogrammed with 30 special moves. You can add six more of your choice.

PRICE: $49.95
COMPANY: INTERACT ACCESSORIES
PHONE: 410.785.5661
URL: WWW.INTERACTACC.COM

boot verdict: 79%

Cool programmability; uncool ergonomics

CAN HE

QAD

(Quintessential Art of Destruction)

Blow away your enemies as you maneuver your craft over constantly changing terrain in an attempt to save up to 200 hostages. An explosive soundtrack and revolutionary technology make each of QAD's more than 20 deadly missions a blast.

COME OUT

It's kill or be killed within the Arenas of Electrostatic Flux. Survive and continue your journey through the galaxy, buying faster, more powerful ships and weapons. With Nihilist's mind-blowing soundtrack and 3D-like effects, you're in for the fight of your life.

Nihilist

TO PLAY?

Battle Slayer

Only the toughest survive in a tournament to find the most perfect specimen in all the colonized planets. So you better choose your character carefully. Battle Slayer's killer audio and multiple play modes are sure to satisfy even the most discriminating taste for blood.

PHILIPS

Product Information Number 114

Hard-Core Games.
Killer sound. Killer action. Killer games. 'Nuff said.
For PC CD-ROM.

http://www.philipsgames.com

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16 TO 3[illegible]

a potential psychotic killer.

H/W

Nokia Multigraph 447Xavc

Multimedia monitor delivers sound and vision

The Nokia 447Xavc combines a 17-inch monitor, stereo speakers, and hideaway color video camera.

The Multigraph 447Xavc represents Nokia's first generation of integrated multimedia and video conferencing monitors, bringing together a solid display, stereo speakers, and a color video camera. Perfect for all-night CU-SeeMe adventures.

Nokia's Multigraph display is a 17-inch Trinitron flat screen monitor with .25mm dot pitch, covered with an anti-glare coating. Win 95's Plug-and-Play option permits a maximum resolution of 1280x1024 with an 85Hz refresh rate, and a max refresh of 150Hz at 640x480.

But the Multigraph's mark of distinction lies in the video system, which sports a hideaway camera (with 500x582 pixel resolution) and an external video camera connector on the back of the display. A sliding panel, located below the face of the monitor, protects the camera lens when not in use. Unfortunately, video features require a video capture card not included with the monitor. The built-in microphone and speakers are also housed on the front of the unit. The two speakers (plus a subwoofer) played both classical and country music with adequate force and fidelity, but they're not superior to even moderately priced standalone speakers.

Unlike previous Nokia monitors, the Multigraph 447Xavc's display, camera, and sound parameters are controlled with on-screen menus, even for basic adjustments such as volume control. The menus are exhaustive and logical, but the front-accessed controls in older models were easier and quicker to use. In addition, weighing in at more than 50 pounds prevents usage with most swinging monitor stands.

All said, the Nokia Multigraph 447Xavc is an eloquent collaboration of monitor, stereo sound, microphone, and video conferencing technology. Now all you have to do is find someone else similarly equipped. After all, it takes two to conference.

— Tom King

Tom King hosts the CompuTalk radio show, heard on Saturdays at the CompuTalk.com Web site.

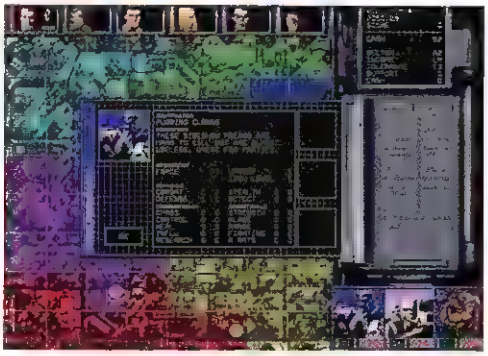
PRICE: $999 (ESTIMATED)
COMPANY: NOKIA
PHONE: 800.296.6542
URL: WWW.NOKIA.COM/PRODUCTS/MONITORS/MONITOR_447X.HTML

boot verdict: 85%
Ultimate A/V integration

S/W

Chaos Overlords

Zen and the art of gang banging



Chaos Overlords is short on visual appeal. All gameplay occurs on this 64-square matrix. The renderings of the gangs you seek to control are imaginative, but they're so tiny you can hardly see them.

Chaos Overlords is the perfect game for bullies and thugs in training. It's also great for nerdy, near-sighted, pimple-faced boys who are fed up with having their lunch money stolen. The game is like boot camp for the former audience; it's vicarious revenge for the latter.

You play a futuristic crimelord, assembling gangs of criminals and murderers to intimidate the citizenry into supporting your cause. Five other crimelords—and the police—stand in your way. You need to battle both in your quest for domination.

These boring combat sequences offer the only visual action during the game.

If you can get past the game's ugly premise, you'll find a turn-based game rich with strategic detail and leavened with black humor. In the end, however, New World fails to pull it off because they don't integrate this humor into gameplay. The bizarre gangs you encounter (you can control as many as 80, including the Pinheads, the Dominatrix Clique, and the Bad Artists) are imaginative in their appearance and description, but they differ only statistically. Some gangs are better at combat; others are better at stealth, but none have unique skills.

Chaos Overlords supports head-to-head and multiplayer gaming on a network or the Internet. The game's complexity requires you to study the manual thoroughly; unfortunately, the document is printed in a hideous, all-caps font that is extremely difficult to read.

I enjoy black humor as much as the next guy. I've blown up my share of toilets and exotic dancers while playing *Duke Nukem 3D*, for example. Shaking down the owner of a bowling alley, on the other hand, just isn't my idea of fun.

— Michael Brown

PRICE: $49.95
COMPANY: NEW WORLD COMPUTING
PHONE: 800.325.8898
URL: NWCOMPUTING.COM

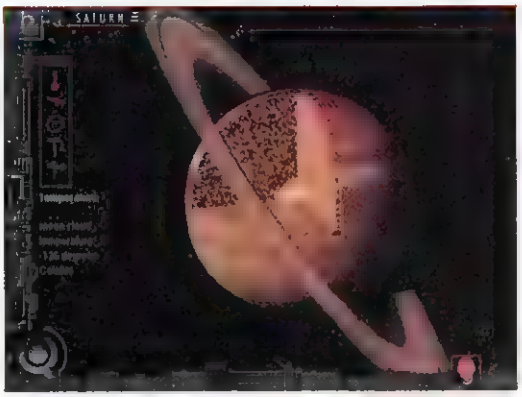
boot verdict: 45%
Unappealing in terms of gameplay, visual and audio style, and premise

boot KICK ASS! PRODUCT

Nine Worlds

Explore the solar system via disc and the Web

Interested in gathering a little information on Jupiter? Conduct a Web search and you'll find 50,000 Web sites containing that key word. A deep well of information to be sure, but just where do you begin? *Nine Worlds*, hosted by regal-voiced Patrick Stewart, harnesses the power of the Web and delivers the best of what CD-ROM technology has to offer at the same time.



Use the tools at the left to learn about Saturn's core and surface temperature, atmosphere, orbit, and diameter. Click the NetProbe to save a topic for later research on the Web.

Stewart's rich, resonant voice greets you and guides you from the start-up sequence to the navigation icons. He is also present throughout the program to give additional information about the solar system via audio clips—just click on the "Patrick Stewart Head" icon to hear more about a topic.

Nine Worlds has three main sections, Planets, Mankind's View (a historical tour of astronomy), and Resource Explorer (an interface to access related areas such as lists of related shareware and publications, a points of interest map, a revolving This Day in Astronomy calendar, and a link to a superb online connection). Each section is easily accessed from the initial screen or from the main menu. But it's the link to Palladium's Web site that makes this CD special: This disc will never go out of date because you'll never run out of data to explore.

Click on one of nine planets and up pops a full-screen view of its globe (the disc has more than 500 archival satellite and telescope photos). Click again on the planet's surface to see its core and learn about its internal and surface temperature, atmosphere, orbital patterns and diameter. You can also access an FMV window supported by Stewart's narration and read brief articles about the planet, its moons and its exploration.

If you want to learn more, select the NetProbe icon, and *Nine Worlds* will automatically save your planetary topics. Then go to the Resource Explorer, which lets you jump seamlessly from the CD-ROM to the *Nine Worlds* Web site, where the program creates a custom Web page with links to up-to-date Internet sites related to your selected topics. (You can also access the site via CompuServe and AOL.) The home page also offers an astronomy chat room, a Cosmic Collection of shareware, and links to cool Stellar Sites such as NASA, the Hubble Telescope, and the Jet Propulsion Labs. (You can visit these places on your own, but *Nine Worlds* saves you from time-consuming searches and is frequently updated with new links.)

Nine Worlds is an outstanding package with stunning visuals, timely information and outstanding integrated Web access. And for $39.95, it's a bargain.

— Angela LoSasso

The *Nine Worlds* Web site holds your custom-made page of NetProbe topics and offers nine sites with tons of links for your astronomical pleasure.

PRICE: $39.95
COMPANY: PALLADIUM INTERACTIVE
PHONE : 800.910.2696
URL: WWW.PALLADIUM NET.COM

boot verdict: 93%

Stunning visuals, killer Web integration

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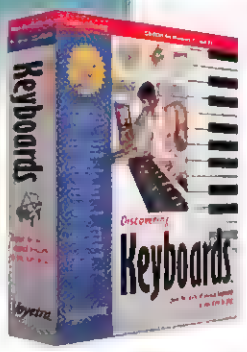

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Product Information Number 122

"Can I Get Higher Performance?"

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—PC Magazine Labs Online, February 21, 1996

Yes When it comes to your computer, performance is all that counts. Top-notch, record-breaking performance. With the latest Cyrix 6x86 processors, you get the only microprocessing engine that rockets beyond the 133, 150 and 166 MHz Pentium® processors. You get the Cyrix performance *plus*

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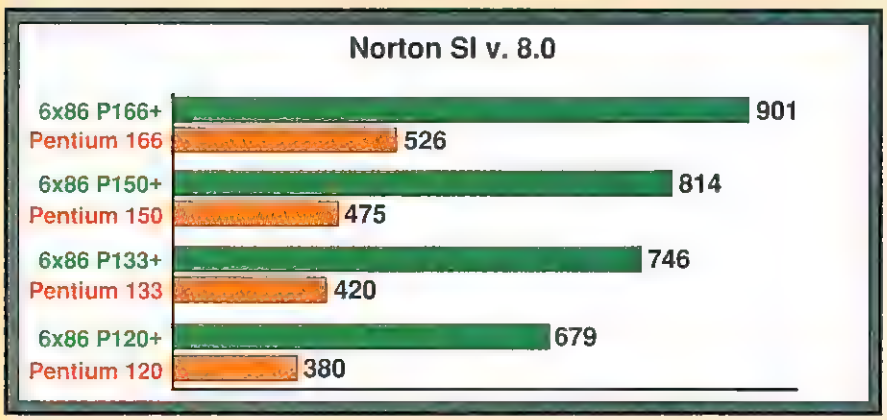

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Product Information Number 124

S/W

Frank Lloyd Wright:
Presentation and Conceptual Drawings
The Wright one, for a price

There's no denying the talent of Frank Lloyd Wright. His career spanned 70 prolific years and changed the face of 20th-century architecture. Now Wright goes digital with a copious four-disc collection to match his career.

Frank Lloyd Wright: Presentation and Conceptual Drawings presents an unprecedented number of Wright's drawings—some 5,000 images produced between 1885 and 1959. Drawn from the Frank Lloyd Wright Archives (an ongoing effort to document Wright's work containing 21,000 original drawings), the discs offer comprehensive coverage of more than 860 projects. Even if you have a substantial knowledge of Wright's work, you will find projects and images you never knew existed. The variety is amazing. To compensate for any gaps in the documentation of some projects, additional materials are provided, including: working drawings, magazine pages, and photographs of drawings that no longer exist.

The futuristic aesthetic of Wright's later work is illustrated in this worm's-eye view of the Huntington Hartford Resort and Athletic Club, 1946.

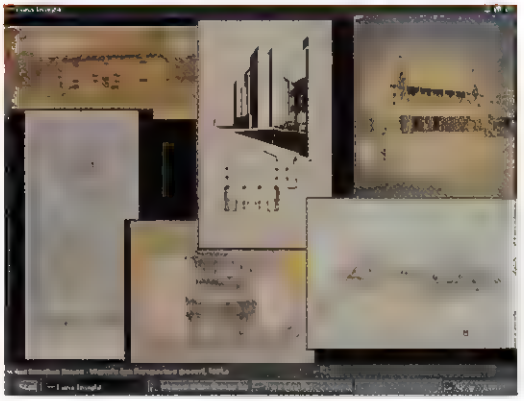
The *Presentation and Conceptual Drawings* discs contain images that will surprise, such as this rose marble presentation perspective of the Guggenheim museum, 1943.

Luna Imaging captured each image at 4000x5000 pixels from 4x5-inch transparencies of the original drawings, and has taken pains to ensure the color-match of the images is true to the original drawings.

There are several ways to search for data about the projects and drawings, including Boolean searches. But don't expect detailed analyses. This is serious Wright eye-candy. These images speak for themselves. Information about the project's characteristics, such as its location, and dates of execution is provided, as well as data specific to each drawing such as the name of the draftsman and the medium in which the drawing was executed; but that's the extent of the text.

Index, the first disc in the set, provides thumbnails of all the images at a customizable base resolution (you have a choice of four, with a default setting of 112x75 pixels). This can be maximized to four times the thumbnail size and then a second enlargement to the full size of your display screen. Continue to zoom or try to maximize a thumbnail beyond these resolutions and the program suggests you insert image discs two, three, or four to view the image at maximum resolution. So, there's no way to avoid disc swapping. You could stay confined to the Index disc's thumbnails, but you would be cheating yourself of the glorious detail captured in the maximum res images (up to 1280x1024) and a 24-bit color depth that's inimitable.

Wright's drawings are powerful, achieving a perfect balance between the aesthetic and the utilitarian. Luna's documentation of Wright uses an application called *Insight*. This software provides a simple and subdued interface, allowing the images to stand out. Each time you select a drawing, an Image Toolbar appears that allows you to pan, maximize, zoom, crop, and adjust its contrast and brightness. The ability to zoom and crop images enables you to view drawings at a level of detail not possible in book form. You can group images for direct comparison on one screen. The discs offer plenty of customizing options allowing you to create and save groups of images, and arrange the thumbnail layout.



By looking at the images on the Wright discs you can trace the development of Wright's architectural ideas. This selection of perspectives from Wright's early career through to his later years illustrates his changing style.

Frank Lloyd Wright: Presentation and Conceptual Drawings features a low-key interface, which allows the illustrations to stand out.

Presentation and Conceptual Drawings is the daddy of all Wright multimedia titles. This is an awesome visual resource. But in my opinion, the hefty price tag can only be justified for higher education institutions and hard-core Wright buffs. If you want to live, breath, and die Wright, this digital collection is perfect for you.

— *Ingrid Bush*

PRICE: $1,200
COMPANY: LUNA IMAGING
PHONE: 310.452.8370
URL: WWW.LUNA-IMAGING.COM

boot verdict: 87%

Fantastic content superbly presented for a high price

S/W

Battleground 3: Waterloo

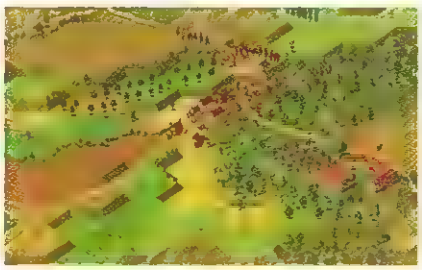
Invest your time wisely

I've never been a fan of hex-grid military sims. Even as a kid, I couldn't make it all the way through those Avalon-Hill board games. They bored me. Give me a good game of *Risk*, *Stratego* or *Battleship* any day.

That was until I started playing TalonSoft's *Battleground* series.

TalonSoft has established itself as the leader in military sims with its revolutionary Battleview combat system in *Battleground 1: Ardennes*. Fortunately for warmongers, TalonSoft didn't rest on its laurels, and *Battleground 3: Waterloo* is easily the best in the series.

Despite its hex-grid format, *Waterloo* has what military sim fans want: an easy-to-use interface, excellent graphics, authentic war footage and soundtrack, and combat-video clips. And most importantly, historical accuracy. TalonSoft has also added several more what-if scenarios, which were conspicuously absent in *Battleground 2: Gettysburg*.



Waterloo offers historic battles and what-if scenarios.

But *Waterloo*'s most significant upgrade feature is the A/I; it's no longer a pushover, being more intelligent and less predictable. The computer opponent is much more aggressive, especially when playing as the French. Like Napoleon, the A/I can move large numbers of troops and use them in lightning strikes before you prepare a defense.

Waterloo has 22 scenarios and offers more than just this one history-changing battle. The scenarios range from the historic four-turn "Napoleon's Charge," a French assault on the Anglo-Allied center, to the 54-turn fictitious confrontation called "It's a Great Day for a Battle," a what-if scenario that gives Napoleon the perfect weather that many historians believe could have led to a French victory.

But beware, *Waterloo* requires a major time investment. One turn, which consists of six different phases, can last from 20 to 45 minutes. A four- or six-turn scenario can take as many as six to eight hours to complete. The Battle of Waterloo, the historic 44-turn scenario, took more than a full week to finish.

Speaking of time consumption, installing the Typical Game version of *Waterloo* took more than two hours and ate more than 100MB of disk space. (The Custom Game version took more than three hours.)

Battleground 3: Waterloo recreates the complexities of battle. Winning and losing involves numerous variables including unit strength and fatigue, weather conditions, and the type of terrain.

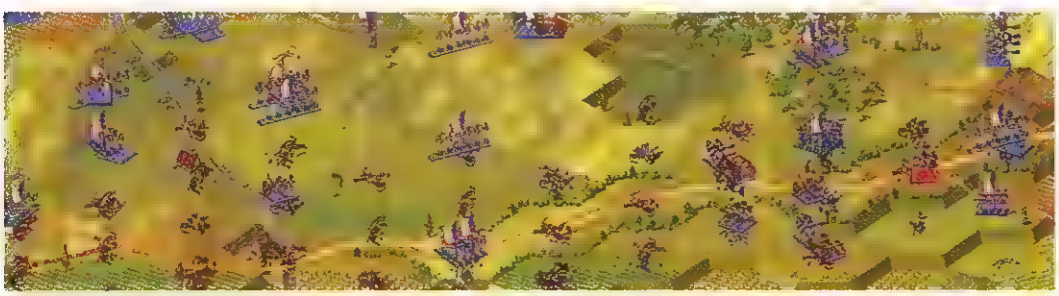
There are several ways to watch the action unfold. The close-up 3D perspective miraculously made the action come to life on my screen. Unfortunately, the units are so big and so detailed in this 3D perspective that you can only see about one-tenth of the battlefield at one time.

To see it all, use the normal 2D shot. It covers more ground and is easier to use if you move a lot of units during a particular phase. This is also true when it comes to your opponent's movements and attacks.

One drawback of *Waterloo*'s hex-grid format is that you lose the ebb and flow of battle. Unlike many other military sims, you can't randomly stop the action and make tactical adjustments. Only in certain phases can you move or fire weapons, so the battle loses a great deal of its continuity. Winning or losing an engagement involves so many variables (unit strength, fatigue, the terrain, etc.) that even Mr. Spock would come away with a migraine.

But these are minor complaints. *Battleground 3: Waterloo* offers the complete military sim package. An aspiring general couldn't ask for more.

— Andrew Miller



The sim's A/I provides a challenging opponent, mobilizing large numbers of troops before you have a chance to prepare your defense.

PRICE: $44.95
COMPANY: TALONSOFT
PHONE: 410.933.9191
URL: WWW.TALONSOFT.COM

boot verdict: 87%

Waterloo's improved A/I will put a hex on you

H/W

Gateway 2000 P5-166XL

A tower of power

Gateway 2000's P5-166XL might not be the prettiest machine around, but if you're looking for a power box you can customize like a classic Chevy, then this is the machine for you. Equipped with a 166MHz Pentium, 16MB of EDO DRAM, 512k of pipeline-burst cache, and enough open drive bays to accommodate a pay-per-view video-delivery system, the XL is a builders' dream.

Video and graphics acceleration are handled by a Matrox MGA Millennium 64-bit graphics card occupying one PCI slot. The MGA-2064W chip on the Millennium, and the card's use of fast, dual-ported Window RAM, makes it a power-house for 2D and 3D apps in both DOS and Windows. Unfortunately, few publishers have ported their 3D games to the Millennium because it lacks important gaming features, including the ability to perform perspective-corrected texture mapping in real time. If you're more interested in creative pursuits, Asymetrix has a version of *3D F/X* specifically for the Millennium, and it flies.

Double Take

If you have the real estate for it (the tower is 23 inches tall), this is the 166 for you. Performance will satisfy all but the most hard-core workstation jockey; and when it comes to upgrading, all that space really pays off.

— Brad Dosland

The Millennium delivered exceptional results with our *Descent* and *Duke* tests. Running at 320x200, the card pumped out 76fps in *Descent II* and 85fps in *Duke Nukem 3D*. Cranked up to 640x480, the card put out 29fps in *Descent II* and 29.5fps in *Duke*. The card ran into problems running *Descent II* at 800x600, but it delivered 20fps running *Duke* at that res—virtually crushing the performance of Packard Bell's Platinum Pro P166 (see the review on page 108).

You'll find plenty of other delicious components stuffed into this two-foot-tall tower, including an Intel Thor motherboard with a Triton chipset, four full-length PCI slots, and three full-length ISA slots. Two of the four SIMM slots are open and ready for expansion. An Ensoniq Soundscape wavetable sound card (with 1MB of sounds in ROM) occupies one of the ISA slots, a Gateway TelePath 28.8 fax/modem (manufactured by U.S. Robotics) takes another. The unit we reviewed had an optional Ethernet adapter in its third ISA slot. (Have a couple of castoff PCs laying around the house? Drop cheap Ethernet cards in them and build a house LAN for game tourneys.)

A massive fan mounted beneath the power supply draws air in and blows it directly across the CPU's heat sink and then down through the rest of the card cage. (If you can't rope anyone into dusting your room, this arrangement might eventually result in an exploding population of dust bunnies inside the case.) Mounts for a second fan are thoughtfully placed above the power supply and at the bottom front of the case. You might need them if you fill the three open 5.25-inch drive bays accessible from the front bezel, the two open 3.5-inch drive bays above the power supply, and the two open 3.5-inch drive bays next to the 2.5GB Western Digital Caviar hard drive.

The Gateway 2000 P5-166 XL is an expansionist's dream, with drive bays and slots galore and plenty of room work with.

The Gateway sparkled when it came to the Ziff-Davis benchmark suite, although its Wearnes 8x CD-ROM drive scored a disappointing 506KB/sec on the CD-ROM WinMark 96 test. (Gateway has since dropped the Wearnes in favor of a Toshiba 8x.) The system scored 24.1 million pixels per second on the Graphics WinMark (at 800x600 with 16-bit color depth) and 1030KB/sec on the Disk WinMark.

The Altec Lansing ACS-400 speakers and ACS-250 subwoofer are plenty loud, but they're by no means an audiophile's dream. The speakers are relatively noisy, and they distort when cranked.

The inclusion of a Dolby Pro-Logic surround-sound decoder seems impressive, but very few game soundtracks are encoded with this technology. (Origin's *Wing Commander IV* is one of the few.) The Ensoniq Soundscape in this system is good, but it can't compete with Creative Labs' AWE32 or Yamaha's new XG card.

With its raw power and expansibility, the P5-166XL is a monster, and you're Dr. Frankenstein.

— Michael Brown

under the hood

the brains

CPU	166MHz Intel Pentium
Cache	512k pipeline burst
RAM	16MB EDO DRAM (128MB max)
Video	Matrox MGA Millennium, 2MB WRAM

the brawn

Hard Drive	2.5GB Western Digital Caviar
CD-ROM	8x Wearnes (now shipping with Toshiba 8x)
Expansion Bus	4 full-length PCI, 3 full-length ISA
Fax/Modem	28.8Kbps Gateway TelePath

the beauty

Monitor	Gateway DX17S (17-inch aperture grille)
Sound Card	Ensoniq Soundscape (1MB sounds in ROM)
Speakers	Altec Lansing ACS-400 with ACS-250 subwoofer

PRICE: $3,149
COMPANY: GATEWAY 2000
PHONE: 888.200.0629
URL: WWW.GW2K.COM

boot verdict: 90%

Power to spare and room to expand

H/W

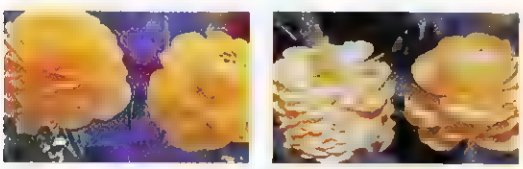
RDC-1 Digital Camera

If it moves, shoot it

Ricoh's RDC-1 digital camera features an optional 2.5-inch LCD display.

Ricoh's new RDC-1 digital camera looks like an old Kodak Instamatic, but it does more than take snapshots. The camera records images, audio, and full-motion video to thin flash-memory cards.

An 8MB card can store up to 81 images with 24-bit color depth and resolution of 768x480 pixels. Alternatively, you can annotate 57 images with 10 seconds of audio each. Full-motion video capture is more of a gimmick than a useful feature; a single 5-second clip fills an entire 8MB card.



The camera maintains excellent color fidelity. The image on the left was taken in full shade; the one on the right in full sun.

Attach the pivoting LCD video monitor and you can see and hear your clips on the spot. The monitor has a built-in speaker and a connection for an AC adapter and battery charger.

The diminutive camera (with 3X zoom) is comfortable to hold, fits easily in a shirt pocket, and tips the scales at just 11 ounces. The monitor adds 8 ounces to the package, but the combined assembly feels fragile. And without a lens cover, it's too easy to put fingerprints on the lenses. A tripod mount, shutter timer, and remote control make it easy to take self portraits.

You can use Ricoh's playback adapter to transfer the still-image and video files (including sound) to your PC or through a modem to an online service. The camera can also receive files through a modem if you attach the optional communication adapter.

The RDC-1 takes better pictures than most other digital cameras, but quality comes at a price: A fully configured system with a single 8MB flash-memory card sells for more than $3,000.

— *Michael Brown*

specs

Video resolution: 420 lines. **CCD:** 1/3-inch array; 410,000 pixels. **Lenses:** f7.1 - f21.3mm, F: 2.8; 9 elements in 4 groups. **Recording format:** JPEG for images; ADPCM for audio. **Dimensions:** 5.25x2.75x.75 inches

Note: Ricoh offers an entry-level model and will introduce a high-end model in December.

PRICE: CAMERA, PLAYBACK ADAPTER, REMOTE, AND SOFTWARE $1,699; 8MB MEMORY CARD $839; 2.5-INCH LCD MONITOR $539; ACCESSORY KIT $219
COMPANY: RICOH
PHONE: 800.225.1899
URL: RICOH.CO.JP/INDEX_E.HTML

boot verdict: 85%

High-resolution images and awesome flexibility, but steep pricing

Packard Bell Platinum Pro

A bootWorthy imposter

Here's a sheep in wolf's clothing. The Platinum Pro's spec sheet reads like a power user's dream: 166MHz Pentium, 24MB of RAM, 2GB hard drive, and *six* expansion slots. Crack the case and run a few benchmarks, however, and you'll discover the bleating heart of a pretender.

The Platinum's case looks like it was designed for the high seas, with a broad base measuring a full 11 inches across. Open it and you'll discover the motherboard lying at the bottom of this tray like a geriatric with a broken hip. A riser board containing three PCI slots and three ISA slots sticks up from its middle. One slot is occupied by a sound/telephony card.

The cage is big enough to accommodate full-size expansion cards, but Packard Bell must think no one will be using them. If they thought otherwise, they would have included support brackets (for full-size cards) and a cooling fan (in addition to the one on the power supply and the mini on the CPU's heat sink). And they wouldn't have rendered the third PCI and ISA slots useless with the unfortunate placement of the aforementioned CPU fan and heat sink.

The heat sink and fan on the CPU obscure one ISA and one PCI slot.

Packard Bell's Platinum Pro is 11 inches wide across the base to accomodate the motherboard.

All four of the machine's SIMM slots are occupied, so you'll have to chuck half its RAM in order to upgrade.

The Platinum's pathetic benchmark numbers are due largely to Packard Bell's decision to use an asynchronous cache (instead of pipeline-burst) and Cirrus Logic's DRAM-based CL-5440 graphics accelerator on the motherboard. Ziff-Davis' Winbench 96 reported a Graphics WinMark of just 5.5 million pixels per second (with 64K colors displayed at 800x600 resolution) and and a Disk WinMark of only 913KB/sec.

Our *Duke Nukem 3D* and *Descent II* tests reported equally wimpy results. Even with *Duke* set to 320x200 resolution, the Platinum was capable of producing just 51.5fps of action. At 640x480 resolution, the frame count dropped to 17fps.

Buy this machine and you'll find yourself drinking Woolite in no time. *Baaaahhhh!*

— *Michael Brown*

under the hood

the brains

CPU	166MHz Intel Pentium
Cache	256k asynchronous
RAM	24MB DRAM
Video	CL-5440, 1MB DRAM

the brawn

Hard Drive	Seagate ST32140A EIDE
CD-ROM	NEC CDR-1300A 6x
Expansion Bus	3 full-length PCI, 3 full-length ISA
Fax/Modem	28.8Kbps

the beauty

Monitor	Packard Bell 1512SL (15-inch shadow mask)
Sound Card	FM synth
Speakers	powered stereo, attached to the monitor

PRICE: $2,849
COMPANY: PACKARD BELL
PHONE: 800.733.5858
URL: WWW.PACKARDBELL.COM

boot verdict: 48%

Gene Wilder would *love* this PC

H/W

Hewlett-Packard Pavilion 7130P

Scanning the horizon

The HP Pavilion 7130P features a scanner built directly into the chassis.

Hewlett-Packard has found a new use for the 5.25-inch drive bay: a home for a Storm EasyPhoto scanner. It's a fantastic idea; unfortunately, it's about the only innovation you'll find in this otherwise pedestrian 133MHz Pentium system.

The EasyPhoto scanner (which HP has dubbed the PhotoDrive) is a treat to use; you just slip a snapshot (5x7-inch max) in the slot. The scanner automatically pulls it in, scans it, launches Storm's *EasyPhoto* software, then spits out the photo. The scanner's optics are capable of 400dpi resolution, but Storm's software interpolation boosts that up to 2400dpi. Once scanned, you can crop, size, color correct, and perform numerous other editing operations on the image. It's no *Photoshop*, but it's fun.

Priced at $2,499, the Pavilion 7130P is competitively priced, especially when you take into account the built-in scanner (which sells for about $200 on its own) and HP's huge software bundle (which includes Microsoft's *Works* and *Encarta 96*, Intuit's *Quicken SE Multimedia Edition*, and Maxis' *SimCity 2000*). Whether you want or need the extras is another story.

The other components in this system are much less exciting. Intel's Holly motherboard features Intel's Triton chipset, but only two of its seven expansion slots are PCI, the rest are ISA. What's worse, the expansion bus is located on a riser card that must be unscrewed and removed in order to access the SIMMs. The machine is shipped with 16MB of FPM DRAM, leaving two slots free.

The chassis has three 5.25-inch drive bays accessible from the front bezel, all of which are occupied. A handy swing-out cage will accommodate two internal 3.5-inch devices. Two noisy fans keep internal temperatures down. Study the outside of the HP's curvaceous case and you'll notice that it lacks a hardware reset button; you'll have to pull the plug if the system hangs. There's also what looks like an infrared comm port, but further examination reveals there is nothing behind the lens.

The S3 64V+ video chipset with 1MB of DRAM on the motherboard delivered solid but not mind-boggling performance in our game tests. (You can shut down the on-board video if you decide to upgrade via a PCI card.) At 320x200, the system racked up 52.5fps and 57fps in *Duke Nukem 3D* and *Descent II*, respectively. At 640x480, performance dropped to 20fps and 21fps, and at 800x600, it collapsed to 10fps and 9fps.

Ziff-Davis' WinBench 96 reported a Graphics WinMark of just 4.4 million pixels per second (with 64,000 colors displayed at 800x600 resolution); its 1.6GB Maxtor EIDE drive scored a Disk WinMark of only 663KB/sec, and the Mitsumi 6x CD-ROM drive scored only 479KB/sec on the CD-ROM WinMark test. These relatively low benchmarks can be explained in large measure by HP's decision to use a 256k asynchronous DRAM cache instead of a pipeline burst cache, and FPM DRAM instead of EDO DRAM.

The 7130P failed to deliver much audio excitement because its Crystal Semiconductor CS4232 chip offers only FM synthesis—good thing all those ISA slots are available.

Although this model is classified as a multimedia system, it doesn't include speakers; those come attached to the optional monitor, where they stick out like Ross Perot's ears. Unless you can't stand mismatched components, you'd be well advised to skip the passive Altec Lansings that HP offers in favor of something with more kick.

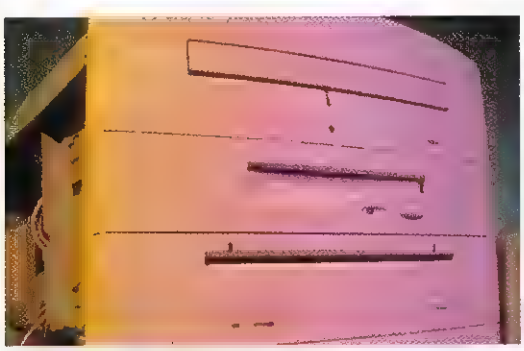
Perhaps that's the best way to sum up this entire system: The PhotoDrive is a lot of fun, but it's stuck in a milquetoast box. Skip the 7130P in favor of a machine with more horsepower.

— *Michael Brown*

PRICE: $2,499
COMPANY: HEWLETT-PACKARD
PHONE: 800.724-6831
URL: WWW.HP.COM

boot verdict: 65%

PhotoDrive lends a high gee-whiz factor, but the rest of the package doesn't hold up



HP's PhotoDrive (a Storm EasyPhoto scanner) digitizes 5x7-inch photos at 400dpi.

under the hood

the brains

CPU	133MHz Intel Pentium
External Cache	256k asynchronous
RAM	16MB FPM DRAM (128MB max)
Video	S3 64V+,1MB DRAM on the motherboard

the brawn

Hard Drive	1.6GB Maxtor 71626AP, EIDE
CD-ROM	6x Mitsumi FX600S
Expansion	2 full-length PCI, 5 full-length ISA
Fax/Modem	28.8Kbps

the beauty

Other	Built-in 5x7 400dpi Storm EasyPhoto scanner
Sound	Crystal Semiconductor FM synth on the motherboard
Monitor	HP D3859A 17-inch Invar shadow mask (optional, $749)
Speakers	Altec Lansing HP 1200 (integrated into monitor)

Duke Nukem 3D

boot KICK-ASS! PRODUCT

A testosterone-injected E-ticket ride through the end of the world

"Come get some."

That is the call of Duke Nukem (and an homage to Bruce Campbell's character in the *Evil Dead* series) as he discovers early 21st-century Los Angeles has been captured by alien perverts. Duke takes foot (and pistol and shotgun and chaingun and grenade launcher and...) to rid the seedy porn stores and strip joints of his beloved home of the menagerie of baddies that infest the fair city. Talk about your illegal aliens. Critters include a *Predator*-inspired warrior, a stop-drop-and-shoot Pig Cop, a hissing, chaingun-wielding reptile, and the biggest, baddest bosses ever seen in a first-person blast fest.

Duke Nukem 3D is the third installment in the *Duke Nukem* series, which started in 1991 when Apogee released the side-scrolling platform game *Duke Nukem* and continued in 1993 with *Duke Nukem II*. *Duke Nukem 3D* was created by 3D Realms, the label Apogee releases 3D games under.

This game has it all. More than 24 levels of a fully immersive world that goes far beyond anything ever seen on screen before. If you're searching for God, and if God is in the details, then God can be found in *Duke Nukem 3D*. These are not just levels to be completed, they are worlds to be explored.

As you run down a city street, glancing over your shoulder at the pigs in rocket scooters who pursue you through an urban canyon of skyscrapers, you notice the details. As you plunge into the blue water and swim down through underwater canyons or board the USS Dallas submarine (from *The Hunt for Red October*) through the underwater hatch, you notice. As you board the working subway train, looking out the front window moments before mowing down some unwary soul that wandered onto the tracks, you notice. And it's the small things. Losing a point of health for plugging your finger into an electrical socket, getting 10 points back for taking a whiz at the urinal.

Matters can get more than a little hairy with *Duke Nukem 3D*. Even if you're packing serious heat.

***Duke Nukem 3D*'s death scenes can get a little graphic.**

The telltale red lines of trip bombs send a clear message: Go away!

... choice words will be shared over cubicle walls for that bastard who tossed a pipe bomb into the elevator just as the door was closing.

As you enter the pool hall in the second level, you see a table all set up to play a game. Hopping atop the table to traverse

The LAPD pigs will come after you with shotguns blazing in *Duke Nukem 3D*. As in real life, the secret to survival is superior firepower.

Duke Nukem 3D Tip

You can edit the user.con file with any text editor to change weapon strengths, maximum ammo, and other variables. Be careful: Changes are universal. As your shotgun becomes a cannon, so will the Pig Cop's.

Everything in Duke's world can be worked over. Witness this stained-glass window's response to a hail of lead.

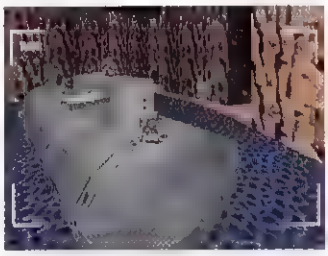
Waste this critter, then grab some of the goodies that float by on the circling sushi boats.

Beautiful shot of the moon... too bad there's a hostile reptile with a chaingun screwing up the view.

the room, you hear the balls clank about. When you glance back, the balls have been scattered. Try using your pistol to sink a few balls. It's a game within a game. You can hit the space bar while alongside the table to shoot the balls too.

Blast an alien standing in a vertically opening doorway, and the door will come down and squish the body. Then, every time the door opens, gooey alien guts stretch between the two halves of the door.

How is all this possible? From the *Duke Nukem FAQ*: "3D Realms' Build Engine is much like the engine used in *Doom*, but with advancements such as looking up and down, reflective floors, mirrors, true rooms above rooms, multi-colored lighting (*Doom* only had white lights), moving vehicles, translucent sprites (for ghosts, explosions, windows, etc.), rotating sprites, and much more. The sectors that make up a map can move during gameplay. This allows, for example, doors to swing open and staircases to move. Also, the level editor is in full 3D mode. With this feature, one can play the game as they add and change levels. Next, the frame rate is not limited to 35 frames per second."



Scattered throughout the game are stations where you can access the surveillance video cameras located throughout the levels. Take a peek at the reception awaiting you at the submarine.

Just when you think you've mastered the game, you can fire up the multiplayer modes. First, there is the usual modem and serial link play. But *Duke Nukem 3D* is at its best when up to eight players enter a DukeMatch over an IPX network connection. F-keys launch custom taunts, and choice words will be shared over cubicle walls for that bastard who tossed a pipe bomb into the elevator just as the door was closing. The game also supports dedicated network gaming services, such as Total Entertainment Network and Dwango.

The LAPD's pigs have taken to sky carts in the future.

Ultimately, *Duke Nukem 3D* is an extremely difficult game to review. It contains too many savory details (such as jetpacks, remote-trigger pipe bombs, the glowing red beams of laser-triggered trip bombs, enormous buildings that explode and crumble to the ground, a shrinking ray that allows you to reduce your opponent to chihuahua proportions and stomp him into cocktail sauce... there I go again, getting all caught up). And, it's hard to come up with anything to be critical of.

It is, as Duke is fond of saying when he finds a new toy, "Groovy!"

— *Brad Dosland*

Duke Nukem 3D Tip

In the arcade upstairs from the movie theater in the first level, step up to the Duke Nukem I game and press the space bar. Duke will tell you some rather personal info, a panel will slide open and you'll get a Holo-Duke that allows you to leave behind a holographic projection of yourself that will draw unfriendly fire away from you.

Much of the sights and sounds of *Duke Nukem 3D* are on the risqué side. The software comes with a parental lockout... but who wants to miss out on such gems as "Your ass, your face... what's the difference?"

The Essential Duke Nukem 3D Cheat Codes

Code	Effect
dnkroz	god mode (on and off)
dnstuff	all the weapons with maximum ammo, plus all keys
dnitems	maximum armor, plus all keys
dnhyper	unlimited steroids
dnclip	turns clipping mode off (great for getting past obstacles)
dnscotty##	warps to a specific episode/level (the first # is the episode, the second # is the level)

PRICE: $39.95
COMPANY: 3D REALMS/FORMGEN
PHONE: 800.337.3256
URL: WWW.3DREALMS.COM

boot verdict: 97%

All your cops 'n' robbers fantasies fulfilled

S/W

Web.Designer

A strong program surrounded by suspect garnish

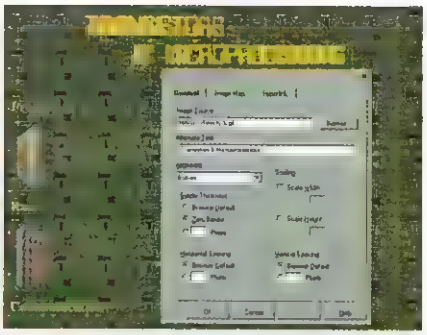
Corel's *Web.Designer* is a tasty catch... with an odd aftertaste. On one hand, the actual application is a great way for both amateur arachnids and Web masters alike to spin their creations, with its combination of a friendly and capable interface plus Corel's entire *Web.Gallery* Internet-ready clip-art gallery. The majority of these 8,000-plus images are very good (used in moderation).

On the other hand, the program comes with more than 100 "professionally designed" templates. The question is: A professional what? Plumber? Tree surgeon? NFL place kicker? Nobody with a shard of taste would use one of these templates without subbing out every single element. Maybe that's the idea. But seeing some of the crap on the Web these days, I'm worried that with this as a starting point, Corel may actually be contributing to the oxymoron "Web page design."

The exception is the useful collection of 10 form templates. While the aesthetic considerations for many of the pages leave much to be desired, the code provided will save you a fair amount of labor (of course, you could always just pirate HTML from online forms you dig, too). Unfortunately, you will still need to work with your server administrator regarding the server setup and CGI scripts before setting the final formatting of your forms.

Web.Designer masks its powerful capabilities behind a comfortable word processor-esque facade that provides as much WYSIWYG functionality as is possible (given the plethora of browsers that will be used to view any given site). With scads of toolbar buttons to perform a bevy of Web page creation/modifications, anyone can create attractive and functional sites utilizing most HTML 2.0 and 3.0 tags, plus most *Netscape* and *Explorer* extensions.

Double-click a page element and a box springs up that allows you to edit most any of its properties. Common hyperlinks from text or graphics only require the entry of a URL path. More complicated image map links just need be drawn and defined. A special bonus feature is the automatic conversion of common BMP, TGA, and PCX files to the Web-friendly GIF and JPEG formats. But don't delete your copy of *Hijaak* just yet; *Web.Designer*'s auto conversion will not optimize the file's palette, and savvy Websters know the secret to snappy sites is reducing the download of big graphics by draining unneeded colors.



Web.Designer **presents a powerful set of web creation tools including one-click forms, buttons, and image map editors. Templates, such as this illegible example, are provided with *Web.Designer* and illustrate the intense evil this utilitarian program is capable of generating.**

Like many of Corel's products, *Web.Designer*'s core is sound, but some of its stuffing is suspect. Buy it for the core and insert your own taste.

— Brad Dosland

PRICE: $119
COMPANY: COREL
PHONE: 800.772.6735
URL: COREL.COM/CORELWEB/WEBDESIGNER/INDEX.HTML

boot verdict: 82%

Web pages made easy... and garish

Total Mayhem

Mutilation is never pretty

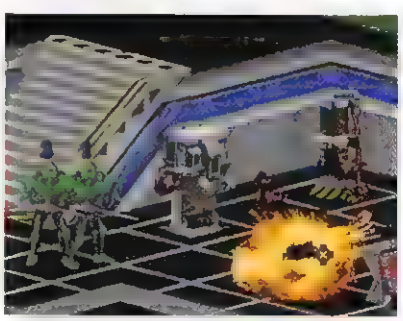
Total Mayhem is a watered-down mutilation of Origin's *Crusader No Remorse*, with a multiplayer mode thrown in to make up for some of the game's ineptitude.

The game opens with a visually stunning intro movie detailing your objective. Unfortunately, these high-quality graphics are exclusive to the cut scenes. Gameplay boils down to having to kill some bad robots with your good mechs. After you complete a few levels (there are 20 in all), you are awarded an additional mech to add to your squadron. Each squadron can have up to six mechs.

Total Mayhem's **cut scenes and environments at the base are graphically stunning, especially when compared to those in the actual gameplay screens.**

Your crew can allegedly be assigned to different tasks. After working my way to a two-man squad, I was never able to separate these Siamese-twin warriors even after hours of trying. In fact, simply maneuvering your mechs is one of the biggest challenges. Assign them to an off-screen location and they're likely to get stuck behind a bush or a corner of a building.

If you're patient enough to play on and lead these mechanical goof-bots around with a string of endless commands, you'll discover that killing the bad bots is a comparatively easy task.



You can zoom in for a closer look at what you're killing, but it doesn't add any excitement to the gaming.

Two features save *Total Mayhem* from being a complete waste: its soundtrack and its multiplayer mode. The music is an immersive rave style that gets you in the mood for the action (that never materializes). The multiplayer mode (up to eight players in Win 95) is a must-have feature that was inexcusably left out of *Crusader* (and its coming sequel). Too bad *Mayhem* isn't an add-on pack to *Crusader*; as a stand-alone, it just doesn't stand out.

— Doug Lombardi

PRICE: $49.99
COMPANY: DOMARK
PHONE: 415.693.0297
URL: WWW.DOMARK.COM

boot verdict: 49%

Weak take-off on *Crusader No Remorse*

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It is up to the player to join the characters in educational challenges throughout this award-winning CD-ROM adventure. A magical story leads the player through problem-solving activities and action-gaming sequences on the way to earning a high score. Three levels of play assure age appropriate interaction for children ages 5 to 10. Movie quality graphics and animations, six original songs and a cast of professional actors are brought to life in full-screen, live interactive video as never before seen in children's software. The experts agree, *Piper* takes children's software to a whole new level of interactive fun. *Piper* is one adventure that you won't want to miss!

"Piper... is a highly professional production with a freshness and entertainment value that will keep the kids coming back. Great music. Engaging plot. Excellent. Four stars."
- CD-ROM Today

"Piper... brings a new level of production values to children's software."
- Family PC

"Piper is thankfully different. Highly recommended."
- Billboard Magazine

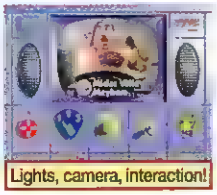
"The characters take on a life that we've never seen before in an edutainment title. Splash Studios has certainly upped the ante for other edutainment producers by creating a real interactive adventure that takes full advantage of current state-of-the-art multimedia technologies."
- The National Parenting Center

"Too often, children's software relies on tried-and-true (and often dull) animation. If anything can get your children to ditch the TV for good, it's (a) CD-ROM like this."
-Multimedia World

Balance the scales.

Play Piper's tune.

Find hidden rats.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Product Information Number 118

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S/W

3D Studio Max

Power for the pros

This *3D Studio Max* rendering of martian war machines used Rolf Berteig's *Combustion* plug-in to create the fire and explosions and volume lighting to create the heat rays. This simple scene took less than a half-hour to model.

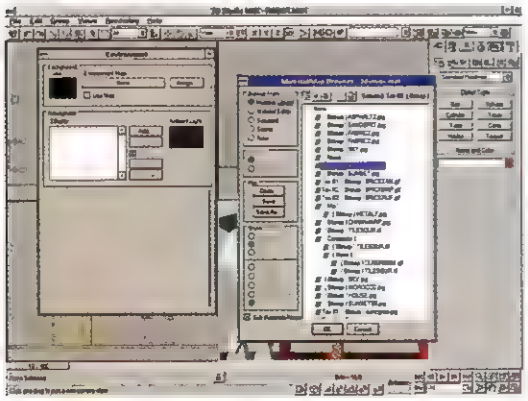
First a word of warning: Amateurs need not apply. Beyond the $3,500 price tag, *3D Studio Max*, the latest rev of Kinetix's 3D modeling and animation package, has some stiff requirements. For starters, *Max* requires Windows NT and at least 32MB of RAM. However, given that *Max* was designed to compete with the likes of Alias' *Wavefront* running on Silicon Graphics' workstations, these requirements are understandable.

In many ways, *Max* is a better product than *Wavefront*. Installation is a snap (even though the expensive software uses hardware-based copy protection—a small encoded chip that plugs into the parallel port). While the menu system and options are daunting, you can navigate more easily than in the typical *Wavefront* session.

Object creation is totally nondestructive—every modification, from simple scaling to patch editing, is saved in each object's Modifier Stack. For example, if an object needs a little more twisting, just go to the Modifier Stack, select the twist performed a half-dozen steps ago, and increase the angle or delete the twist entirely.

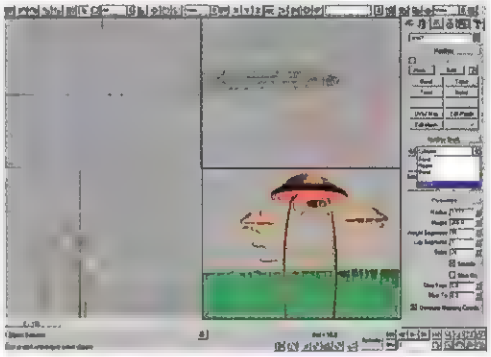
The Materials Editor, where all the properties and maps are assembled, only lets you work on six materials at a time, necessitating a lot of shuffling. However, *Max* allows for a practically infinite series of multi/subobject materials. This lets you assign more than one material to a single object, layering each material on the object one surface at a time.

Max's particle system generator is where this program really shines: The system fully supports plug-ins. A designer once told me the problem with 3D programs is that every single one does something better than the others; and if you're serious about 3D, you need three or four packages to handle everything. This is where *Max*'s plug-in concept is so elegant, because if there's a feature you really need, (or, if one feature doesn't execute well, such as the particle generator), find a plug-in that does the job better. Once installed, it will blend in seamlessly with the interface.

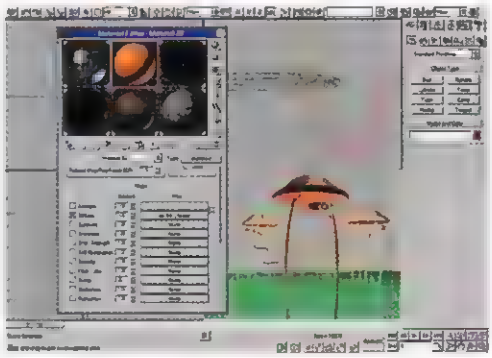


The menu layout is somewhat complex and there are numerous submenus, but nothing you need is ever more than a screen away.

Granted, many third party plug-ins cost up to $1,000 (although some are appreciably cheaper; a few, including *Combustion*—a fire and smoke generator—are freebies that can be grabbed off the Kinetix Web site). If you're a serious designer and can afford the package, then the ability to pick and choose which additional features you need for your work is well worth the cost. (The concept is catching on in the high-end 3D world: The latest version of NewTek's *Lightwave 3D* also supports plug-ins.)



The Modifier Stack eliminates the worry of irreversibly changing an object—if you don't like the results, you can change or delete the modifier.



The Materials Editor only handles six materials at a time, but it's relatively easy to use and extremely flexible.

To describe all the features is simply beyond the scope of this review—*3D Studio Max* is that powerful and flexible. (I could spend the next six months fooling with it and then write a book.) If you need a relatively inexpensive top-flight 3D package ($10,000 to $15,000 for an NT system with *Max* compared with $25,000 to $50,000 for a low-end SG workstation), *3D Studio Max* does everything you want, and with plug-ins, then some.

— Jeff Lundrigan

PRICE: $3,495
COMPANY: KINETIX
PHONE: 415.507.5000
URL: WWW.KTX.COM

boot verdict: 92%

High-end 3D for those without a SG workstation

H/W

Color QuickCam

Plug, aim, and shoot

The Connectix Color QuickCam is smaller and lighter than a baseball and looks as slick as the grown-up toys found at the Sharper Image. But the Color QuickCam is more than a gadget: It's a video and still camera and digitizer wrapped up in an affordable little ball.

The Color QuickCam easily focuses on objects as close as one inch or as far as across the room.

Pull the QuickCam out of the box, and you'll be ready to shoot photos and stream video in less than 10 minutes. The camera's small size belies its power. This tiny package offers built-in features such as a proprietary VIDEC video compression algorithm, f/16 aperture, 5.7mm lens with 48-degree view and electronic zoom, auto brightness and hue settings, controls for saturation, white and black balance, red and blue levels, plus *QuickPICT* and *QuickMovie* software.

Connectix has made some other improvements on their original grayscale QuickCam. The camera has impressive 24-bit color depth and 640x480 resolution for still photography and a focus ring on the front of the camera (which can zoom in on objects as close as one inch from the lens or accurately focus on those across the room). Taking a photo is easy: Click *QuickPICT*'s Take Picture button. The digital images are suprisingly crisp, and can be saved as PICT, JPEG, or TIFF.

Use the Color QuickCam for video conferencing via the Internet, or use the AutoCapture feature to grab new photos at regular intervals to update a Web site.

The Color QuickCam captures 24-bit color photos and video images up to an impressive 24fps with its built-in video compression algorithm.

Capturing video with the QuickCam doesn't even compare with hassling with a standard video camera, cables, and motion-capture boards (or even Play's similarly priced Snappy). Click on the record button to capture in 24fps at 160x120 resolution, or adjust the settings to grab in time-lapse intervals. The sometimes lossy video won't help you become the next Spielberg, but you can use the camera for video conferencing via the Internet using Connectix's VideoPhone software ($59) or an app like CU-SeeMe.

— *Angela LoSasso*

COMPANY: CONNECTIX
PRICE: $229 (ESTIMATED)
PHONE : 800.950.5880
URL: WWW.CONNECTIX.COM

boot verdict: 86%

Designed and priced right

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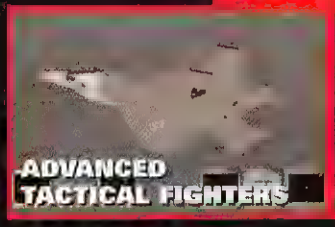

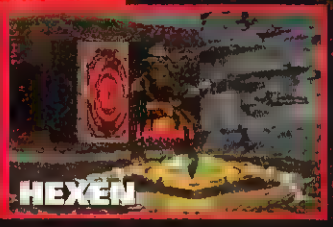

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boot radar

PRODUCT ANNOUNCEMENTS: THEY **TELL** US, WE **PASS** IT ALONG

Performance without the premium

The **Venturis FX** family of Pentium-based desktop systems from DEC caters from those in need of an entry-level PC to the high-end power user who demands Windows NT on their desktop. Venturis FX models FX5100 to 5166 are shipping now and range in price from $1,679 to $2,789 based on configuration. **Digital Equipment Corp.: 800.344.4825; www.pc.digital.com**

Scan it

Panasonic has added an entry-level unit to its production-scanner line. The **KV-SS25**, priced at $4,599, has a maximum scanning rate of 20 pages per minute, processes a variety of paper sizes and weights, has reverse gravity feed, one-sided and two-sided scanning modes, operator-selectable resolution from 150dpi to 300dpi, and a space-saving, mini-tower design. **Panasonic Computer Peripheral Co.: 800.742.8086; www.panasonic.com**

Mystique drops in price

Matrox has announced a price cut for its **Mystique** 3D graphics accelerator even before the card has shipped. Mystique will ship at an estimated street price of $199 for the 2MB version, and $279 for the 4MB version (starting in August), and will be bundled with a selection of software and shareware games including MechWarrior 2 and Scorched Planet. **Matrox Graphics Inc.: 800.361.1408; www.matrox.com/mga**

Video and sound on one card

Now you can buy an MPEG-1 playback card that combines great video quality with built-in sound capabilities and optional output to NTSC monitors. The **Realmagic Ultra** offers support for 24-bit color depth and has built-in Windows PCM stereo audio playback that eliminates the need for a separate sound card. The standard board retails for $399; $489 with the TV tuner option. **Sigma Designs: 800.845.8086; www.sigma.com**

Getting touchy

Three new touchscreen monitors have been announced by Mitsubishi Electronics. The **PrecisePoint** line includes the 5800 (15-inch), 8705 (17-inch), and 8905 (20-inch). Offering a touch contact requirement of only 3ms and high accuracy (± 1 percent), they are

among the most sensitive and responsive monitors in the industry. Ranging in price from about $1,500 for the PrecisePoint 5800, to $2,000 for the 8705, and $3,200 for the 8905, all have a 135MHz bandwidth allowing them to support a typical non-interlaced resolution of 1280x1024 at a 75Hz refresh rate. Also from Mitsubishi is the **Diamond Scan 15VX** 13.8-inch diagonal viewable image color monitor. For around $450, the 15VX features 0.28mm dot pitch with 1280x1024 at a 60Hz refresh rate. **Mitsubishi Electronics: 800.843.2515; www.mela-itg.com**

Monitors for the pros

ViewSonic has added two new monitors to its high-end **Professional Series**: the P815 and P810. Both monitors have a 21-inch (20-inch viewable) screen and offer

0.25mm dot pitch. The P815 offers a 250MHz video input bandwidth and displays resolutions of 1800x1440 at a 76Hz refresh rate, and 1600x1,200 at a 91Hz refresh rate. While the P810 has resolutions of 1600x1200 at a 76Hz refresh rate, and 1280x1024 at an 88Hz refresh rate. The P815 is priced at $2,195; the P810 at $1,845. **ViewSonic: 800.888.8583; www.viewsonic.com**

All that Jazz

A new line of multimedia speakers, the **Jazz 3D Series**, offers a three-position 3D switch that controls the intensity levels of the 3D sound. There are three sound control settings—Music, Game, and Theater—enabling you to customize your 3D sound, plus a host of other features.

Three models will be available: the 10-watt JS-100 for $74.95, the 20-watt JS-200 for $99.95, and the 40-watt JS-300 for $124.95. The 3D Series will also be available as a three-piece system which includes the JS-900 subwoofer for added bass response. **Jazz Inc.: 818.336.2689**

Speed freaks

It's unlikely you'll ever set one up on your desktop at home, but you have to admire the speed of the new entry-level and midrange **AlphaStation 255 and 500 workstations** from DEC. They're fast, damn fast. Prices start at $7,399 for the 255 series, and $15,863 for the 500. AlphaStations support Digital's 64-bit operating systems—Digital UNIX and OpenVMS—and Windows NT. The 500 workstation includes 2MB of fast L3 cache, 256-bit memory bus, up to 8GB of internal storage in five drive bays, four PCI slots, support for dual-fast and wide SCSI-2 channels, Ethernet and Fast Ethernet, and up to 512MB of RAM. Enough said. **Digital Equipment Corp.: 800.344.4825; www.pc.digital.com**

Real 8x performance

The **CSD-880E** 8x CD-ROM drive from Sony claims to overcome the problems inherent with high-speed performance. Featuring an average access time of 160ms and a data transfer rate of 1.2MB/sec that enables support for MPEG-2 video, the package comes bundled with Sony Navigator software. The CSD-880E is in stores now and retails for $189.99. **Sony Electronics: 800.352.7669; www.sel.sony.com/SEL/ccpg**

Practical storage

Sony Electronics' newest generation of **Spressa CD-R drives**, the Spressa 940 internal drive, and 941l external, incorporate Sony's CD-R file system (CDRFS) technology, enabling consumers to use the drives on their desktop as easily as a hard disk or floppy drive. The result: The

Spressa's are practical secondary storage products that allow you to delete files as you would on a hard or floppy disk. They incorporate a SCSI-2 interface and their 2x recording speed enables them to record a 650MB disc in as little as 45 minutes. Spressa 940 and 941l are available now for $899.95 and $1,059.99 respectively. **Sony Electronics: 800.352.7669; www.sel.sony.com/SEL /ccpg**

Now that's smart

4D Web Smart Server is a complete tool kit for Internet and intranet Web development, providing solutions for creating dynamic Web pages; database publishing; and total integration of Web, FTP, e-mail, and real-time database access into unified systems. The SmartServer contains components from ACI and several of its leading developers and is shipping for Windows now at $1,195. **ACI USA Inc.: 800.881.3466; www.aci-4D.com**

See the light and get in sync

New from Texas Instruments are the **6000 and 6000Si series of personal organizers**. All organizers offer the Indiglo night-light enabling you to use the organizer in dark environments, and have been designed to use the optional PS-6155 Connectivity Kit ($75) that allows you to connect to your PC for easy data transfer. The 6000 series includes the PS-6360i for $79.99, and the PS-6565i, which offers more memory and includes

the PC Connectivity Kit, for $159. The Si line of organizers (the PS-6760Si, PS-6860Si, and PS-6960Si) offer Data Synchronization that provides one-touch updating of information between the organizer and your PC, more memory, larger display area, and are available in three memory configurations (64KB, 128KB, and 256KB respectively). The Si line is priced at $110, $149, and $195 respectively. There's also a PS-6965Si bundle for $239 that includes the Connectivity Kit. **Texas Instruments: 800.842.2737; www.ti.com**

Picky, picky, picky

A new line of 120MHz and 133MHz Pentium multimedia notebook PCs from Kiwi Computer are now available. The line is known as **OpenNote** because of its

open system architecture, which allows for a true bare-bones system that can be custom configured. Kiwi allows you to select the CPU, memory, and hard drive of your choice, and offers a number of expansion options. There are six models in the 680 series with base prices ranging from $1,599 to $2,299. **Kiwi Computer: 408.492.9188; www.kiwicom.com**

Sharp notebooks

Sharp is shipping a new Pentium notebook. Priced at under $6,000, the **PC-9080** weighs in at 7.3 pounds and features a 12.1-inch screen, which offers greater brightness and 38 percent less power consumption than the previous generation of notebooks; a 133MHz Pentium, 16MB of RAM, a 1.3GB hard drive, a 6x CD-ROM drive, and a built-in 28.8Kbps fax/modem. **Sharp Electronics Corp.: 800.237.4277; www.sharp-usa.com**

Get smart

The **SmartNote 600** is the latest addition to the line of notebook computers from New World Technologies. Based on Intel's Pentium 133MHz, the SmartNote comes standard with an 11.3-inch active matrix color screen, 28.8 fax/modem, 4x CD-ROM drive, NTSC/PAL output, MPEG utility, and Microsoft Office Pro Software. Prices start at $4,995 for the 16MB notebook. **New World Technologies Inc.: 800.443.8885**

So simple

Valis infoShip for Windows, which lets desktop publishers add multimedia elements to portable documents created with DTP software such as QuarkXpress, PageMaker, and FrameMaker, is now available for $589. The drag-and-drop interface lets you add audio, video, graphics, animation, and even executable programs—without programming or scripting—then bind your electronic publication for distribution onto CD-ROM, floppy, or via the Internet. Simple. **The Valis Group: 800.825.4704; www.valisgroup.com**

Mega projection

If your next big contract is riding on your presentation, or you feel the need to project your insignia Batman-style on the buildings of your town, you'll be interested in the **LVP-G1A**—a data video projector with a three panel LC polymer composite active matrix for true representation of 16.7 million colors, the ability to accept RGB, NTSC, PAL, and SECAM signals for a 640x480 VGA display, and project screen sizes from 20 inches to 300 inches. It has multiscanning capability, is portable, and costs $7,995 (estimated street price). **Mitsubishi Electronics: 800.843.2515; www.mela-itg.com**

See me, hear me

Specom's **Internet VideoPhone**, a Windows software program, allows you to video conference over the Internet. VideoPhone maintains the direct dial function, and has the added ability to send high-res images over the Net for the cost of a local call, allowing you to see the other party in real-time live video. The VideoPhone is available now for $69.50. **Specom Technologies: 408.982.1880; www.specom.com**

Meet face-to-face with i2i

The **i2i PC** from IPC Peripherals includes a 100MHz PC with a built-in video conferencing system, which includes a full-motion video capture card with ISDN interface, telephone handset, Win2Win video conferencing software, and a color digital camera for $4,000. **IPC Peripherals Inc.: 510.354.0800; www.ipcp.us.com**

From humble fax to...

Now you can transform your humble fax machine into a multifunction device, operating as a printer, scanner, and copier, while never relinquishing its ability to send and receive faxes. A new add-in PC card from Castelle that's Win 95 Plug-andffl-Play ready is the key. The **Personal FaxPress 100** has a list price of $249 and requires an ISA slot. **Castelle: 408.496.0474; www.castelle.com**

Snap happy for less

The **Kodak Digital Science DC20 Camera** is the first in a series of affordable point-and-shoot digital cameras targeted at the home computer user. The DC40 Camera and DC50 Zoom Camera are already

used in a variety of business and online applications, but the DC20 is the first snappy tool for the home user with an affordable price tag of less than $350. The DC20 is light and compact, has 1MB of memory that stores either eight or 16 pictures (depending on the resolution selected) in full 24-bit color, and comes bundled with a variety of software, including: Picture Works Technology's Photoenhancer Special Fun Edition, Kai's Power Goo from MetaTools, and Slides & Sound Software from InMedia Presentations. **Eastman Kodak: 800.235.6325; www.kodak.com**

Ultimate Control

The Ultimate PC Controller from Mad Catz offers ergonomic design, a floating D-pad for quick response, four action buttons, and four independent turbo shoulder buttons. Available now for $24.95. **Mad Catz: 800.659.2287; www.madcatz.com**

The thrust of the matter...

Thrustmaster has announced a number of new game controllers: The $69.95 **Phazer Pad** has two analog triggers, a throttle wheel, an eight-way D-Pad, and is

completely user programmable; The **Grand Prix 1** driving wheel (a $99.95 version of the T2 wheel and pedals) clamps to your desk and

offers quick access acceleration, braking, and shifting control on the steering wheel; The **Rudder Control System Pro** works with all simulators supporting external rudder pedals and is priced at $149.95. **Thrustmaster: 503.639.3200; www.thrustmaster.com**

May the force be with you

A new force-feedback joystick from CH Products will ship in September. Priced at $149, the **Force F/X** will offer a variety of motions including jolt, vibration buffeting, and vector force (each function

controlling certain movements of the stick and reacting through the handle). This fall, the company will also be shipping the **F-16 Fighterstick**, which offers 24 programmable button functions (price TBA). CH Products is also designing a wireless joystick for release in 1997, which will have 14-button function and use radio frequency to provide more than 70 feet of range between the stick and the screen. **CH Products: 800.624.5804; www.chproducts.com**

Surf the 3D wave

VR Surfer from VRex is wireless 3D stereo eyewear that works with either

your TV or computer. The VR Surfer kit includes the 3D LCD eyewear, transmitter (with a range of up to 12 feet), 3D videotape, and CD-ROM software for $69. **VRex: 800.877.8733; www.vrex.com**

The OS that wouldn't die

Even though almost no one uses it, IBM is updating its OS/2 operating system. IBM has announced that the next version of OS/2 Warp, code-named **Merlin**, will integrate Sun Microsystem's Java into the operating system, allowing it to natively run Java apps and Internet applets independent of a Web browser. Merlin, scheduled to ship in the second half of '96, will come with a built-in Java Developer's Kit plus the run-time code necessary to run a Java application. **IBM: 800.426.3333; www.ibm.com**

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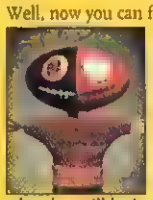
Ever feel the need to stick it to your boss? Well, now you can for less than $20 with



Splashdown Productions' **Animated Voodoo Doll**. Mixing 3D technology with 2D cel animation, Voodoo Doll is a stress buster with an edge that will be in stores in September. **Splashdown Productions: 818.973.4855; www.missionc.com**

Let your e-mail speak forth

Midisoft Sound Bar software allows you to integrate all PC sound capabilities into one location, so you can easily control sound on your PC. Sound Bar's voice recording capabilities let you replace text with voice for sending e-mail and other business messages for only $19.95. The software comes bundled with a microphone that plugs into your PC's sound card for recording messages. **Midisoft Corp.: 800.776.6434; www.midisoft.com**

Animated e-mail

@lohal is an animated e-mail program that produces tiny (due to the program's

compression engine) self-playing files that embed themselves in standard e-mail messages. @lohal contains ready-made greetings plus do-it-yourself wizards that let you create your own. Available in September for $49.95. **Media Synergy: 800 793.6320; www.mediasyn.com**

The Heroes are back

The sequel, **Heroes of Might and Magic II: The Succession**, has been announced. Lord Ironfist has died and his sons' struggle for power has resulted in civil war. Heroes will be in stores in October for $59.95. Also scheduled for release from

New World Computing are **Viper: Operation Red Sector**, a futuristic flight/combat sim, and **Wages of War**, a strategy game set in the year 2001 in a vicious corporate world where you are a young entrepreneur trying to succeed. Viper and Wages will be available in September for $59.95 and $49.95 respectively. **New World Computing: 800.325.8898; www.nwcomputing.com**

MMX gaming

Beware the cancerous red fungus of **POD**, the new sci-fi racing game from Ubi Soft Entertainment, which is one of

the first games developed for Intel's new MMX technology. Escape before the fungus engulfs everything and the planet explodes. Available at Christmas for systems equipped with MMX processors and for conventional Pentiums in April '97. **Ubi Soft Entertainment: 800.824.7638; www.ubisoft.com**

Round the track... again

Sierra is at the sequel game again, this time to milk mileage from its NASCAR licence. **NASCAR Racing 2** lets you race

on 16 tracks with better graphics, an increased use of sound effects, more multiplayer support (including a network feature that allows up to eight players to race against each other over a LAN), and a more intuitive interface than its popular predecessor. Available for an estimated street price of $59.95 this fall. Sierra has also announced an Internet version of NASCAR. **Sierra: 800.757.7707; www.sierra.com**

Avoid HTML

Peak Technologies has built a Web authoring tool entirely in Java, thus eliminating the need for non-technical users to have to grapple with HTML. **Web Page Builder** will ship in August and will cost $49.95. **Peak Technologies Inc.: 800.453.5322; www.peak-media.com**

Enter the Web suite

Web Office provides you with all the tools you need for professional Web development in a full-featured, integrated suite of easy-to-use, 32-bit Web authoring and publishing tools, including: Web Doctor, HTML Studio Tool Kit, and Internet Assistant for Microsoft Word for Windows. Priced at $499 and available now. **Blue Sky Software: 800.571.9764; www.blue-sky.com**

Read all about it

Guidance for the insecure and those in need of Java is being provided by Osborne/McGraw-Hill. For Web mavens, there is **JavaScript Essentials: Creating Interactive Web Applications** a book/CD-ROM bundle that will get you started with an overview of JavaScript and Java; price is $34.95. If you need guidance about how to stay a step ahead of those slippery hackers, **The Windows NT Security Handbook** can help. At $29.95, it will guide you through crucial security issues and provide an overview of how to craft defensive strategies. **Osborne/McGraw-Hill: 800.722.4726; www.osborne.com**

Kick Ass Web spinning

Several book/CD-ROM bundles are being released for Web developers in a Kick Ass series from Coriolis: **Web Developer's Guide to Sound and Music** covers the hardware and software tools you'll need,

licensing and copyright issues, and provides instructions for audio capture; **Web Developer's Guide to JavaScript & VB Script** goes beyond Web publishing to true Web development and compares JavaScript with popular programming languages, teaches you the basics for incorporating VB Script into HTML, and covers site security issues; **Web Publisher's Guide to Multimedia & Video** provides an in-depth look at new Web technologies, including RealAudio, ShockWave, MBone, VRML, and Java, and has step-by-step instructions to follow so you can make the most of these technologies. The books are in stores now at a cost of $39.99 each. **The Coriolis Group: 800.410.0192; www.coriolis.com**

GAME THEORY

◀29 narration, and sound, in evoking the atmosphere and spirit of the stories of Edgar Allan Poe. That in its best incarnation, this kind of title (also built with *Director*) is still not a real game is telling evidence of how little can be done with this formula.

On the other hand, a super-charged, updated version of the more traditional adventure game can still pack one helluva wallop. Just check out *Full Throttle*. This is an ambitious game with terrific animation and art, good voice acting, and a full-blooded musical score. What's more, it's a *game*. There's something more to do than just twiddle. There are interesting characters to interact with, action sequences, and puzzles. Since the puzzles of *Full Throttle* arise out of the locations, characters, and story, they have more substance. Rather than flipping switches, you're using objects or finding different ways to approach a given situation. The story matters, and so do the people. In twiddle games, story is inevitably thin and characters

Interaction is limited to clicking in the proper sequence. Period. These are computerized Rubik's Cubes, and they are stultifyingly boring...

nonexistent. They almost never make you laugh out loud (as least not intentionally), as *Sam and Max* or *Full Throttle* do, or involve you in any meaningful way in their world. They are sterile, dry, and lifeless worlds, and we are not led to care. Even the cartoon world of a *Full Throttle* is more "real" and involving than the barren emptiness of a *Myst*. *Full Throttle* uses new sound and graphics technology to achieve its goals. Twiddle games are instead used by the technology: They exist only to show how slick games can be made.

But that won't stop people from trying. The Millers are hard at work on *Myst II*, which will probably be as big a hit as the first. Meanwhile, the Frankenstein's monster they helped create is rampaging across the countryside, despoiling the field of computer gaming and twiddling all the way.

REVIEWS: HITACHI

◀95 excellent hard disk and CD-ROM drive performance, but had lackluster graphics speed in Windows. Ziff Davis' WinBench 96 reported a Disk WinMark of 623KB/sec and a CD-ROM WinMark of 399KB/sec. The Cirrus Logic 7543 PCI video chipset, however, earned a Graphics WinMark of just 6.37 million pixels per second at 800x600 resolution with 256 colors.

Graphics performance in DOS, on the other hand, was surprisingly fast. Running *Descent II*, the M-120T delivered frame rates of 43fps at 320x200 resolution, a respectable (for a notebook) 16fps at 640x480, and 8fps at 640x480. Its performance with *Duke Nukem 3D* was slightly slower, putting out 35fps at 320x200, 11fps at 640x480, and 7fps at 800x600.

Double Take

How powerful can a system be if the power cuts out abruptly? As I was finishing a doc, a trill series of beeps sounded, followed seconds later by a system shutdown. No chance to save my work. Where's the `two minute warning` when you need it?

— Brad Dosland

The Hitachi's on-board sound is a disappointment. Audio samples not only sound thin—as notebook DACs are wont to do—but they crackle with noise and hiss. In another compromise to accommodate the sliding hinge on the display, the speakers are mounted flat on the deck behind it. It's hard enough to get good sound out of a notebook without building an echo chamber around them. The speakers don't put out much volume, either.

When it comes to keyboards, everyone has their own preference. I prefer a firm keyboard that offers plenty of tactile feedback. I *love* the keyboard on the M-120T; you might hate it. I found it to be logically laid out, with oversized backspace, tab, and shift keys. A 10-key numeric keypad is embedded. Cursor control keys are arranged in an inverse T and isolated, so they can't be mistaken for anything else. Hitachi had to omit the Windows 95 Start and Menu keys to accommodate this arrangment, but those extra keys drive me nuts anyway. A trackpoint cursor-control stick is mounted in the middle of the keyboard.

To its credit, Hitachi didn't take the easy way out by producing a copycat product. As far as the M-120T is concerned, however, I'll wait for a few refinements before recommending this player for the majors.

— *Michael Brown*

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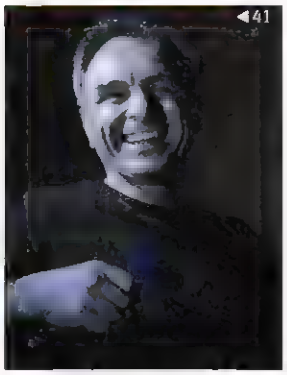
URL: WWW.HITACHIPC.COM

boot verdict: 80%

With a few refinements, this machine could be a player

JEAN-LOUIS GASSÉE


◀41

it. One for the appliances in the living room, so to speak. One for the devices in the closet, because if you're a real geek you have some hardware in the closet. And one to get traffic from your remote because you want to shut up your mother-in-law on the computer answering machine. Seriously, you need to be able to run the computer from the clicker. It sounds like it's a bit much. But when you're a real geek, it's never enough.

boot: Will the BeBox's OS update recently posted on the Web be the last before the hardware is shipped?

Gassée: No, no. Some bug fixes will occur. There will be another release in late summer. It's going to be a lot of functional improvements from all over the map, from graphics, the game kit, scripting. There's a long list. We are still in the phase of putting the foundation on the frame of the house. Then visible work seems to happen at a rapid rate. Some day we will reach a point where things will slow down.

boot: You have worked in both the European and American computer industries. Your knowledge of global markets must give you an edge to understanding and exploiting opportunities other companies might miss. Can you give any examples?

Gassée: In Northern Europe, for instance, there is a very strong Internet academic computing tradition. Also Japan. For some reason, I have a number of connections in Japan, where they also have a very fine academic computing tradition. The students and young executives are, believe it or not, very pro-America. They also happen to be pro-French, so it doesn't hurt to be both in my case. [The Japanese] like products that come from the U.S. because they exhibit a spirit of creativity and independence, which is a little bit stifled by the structures of corporate life in Japan. So we have a good entrée into Japan. Now we need to deserve it by behaving in ways that are consistent with the expectations of Japanese customers, who are very careful in this market.

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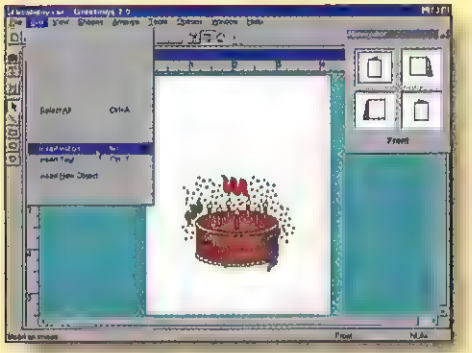

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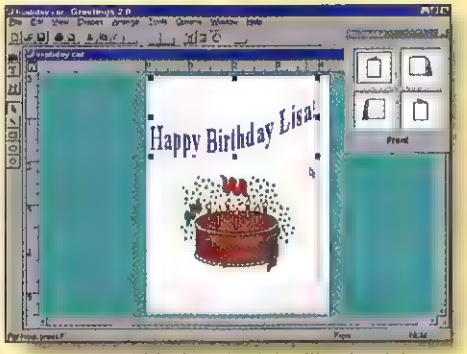

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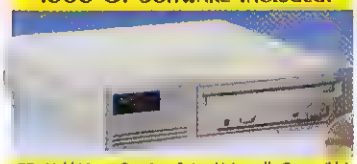

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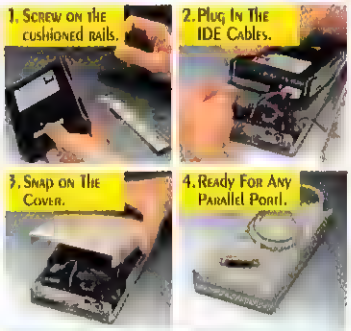

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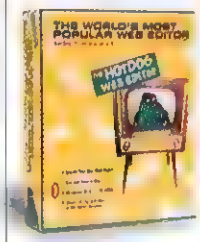

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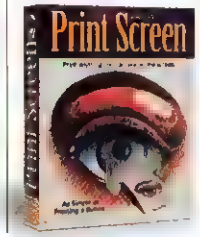

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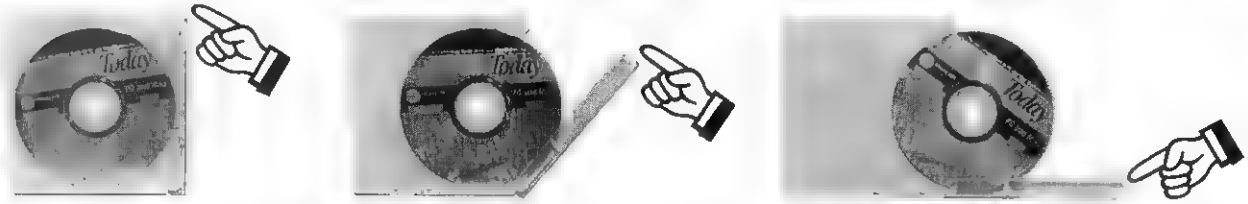

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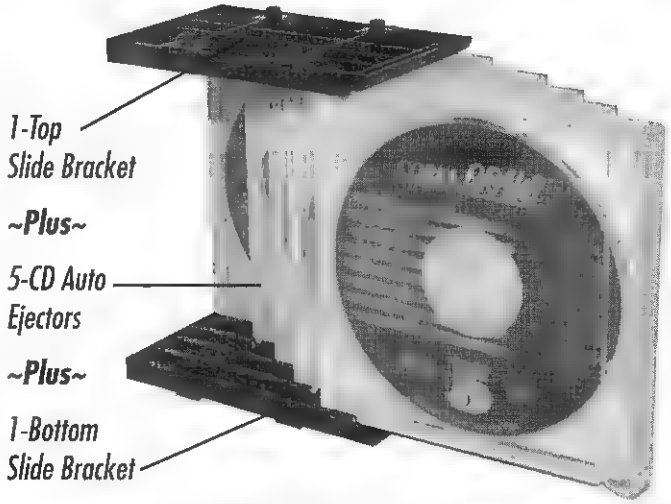

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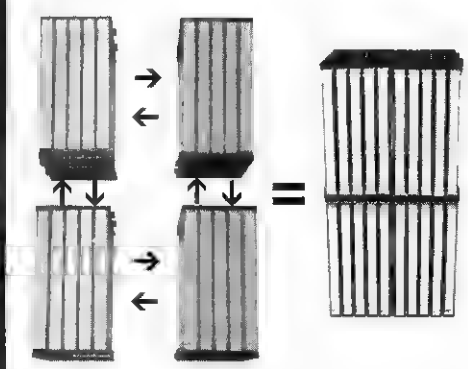

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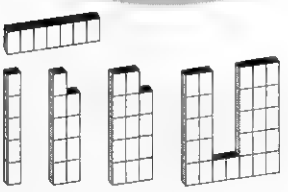

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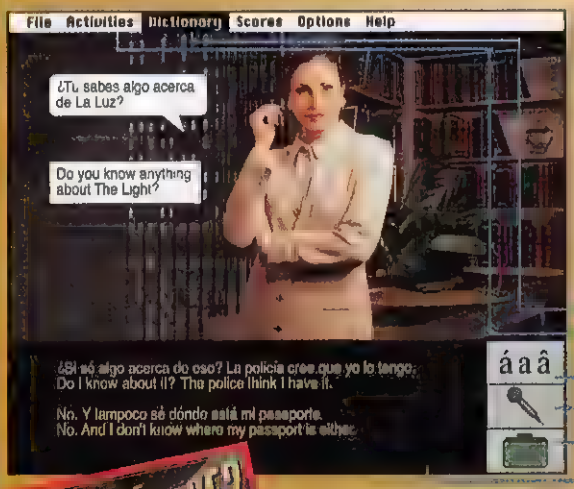
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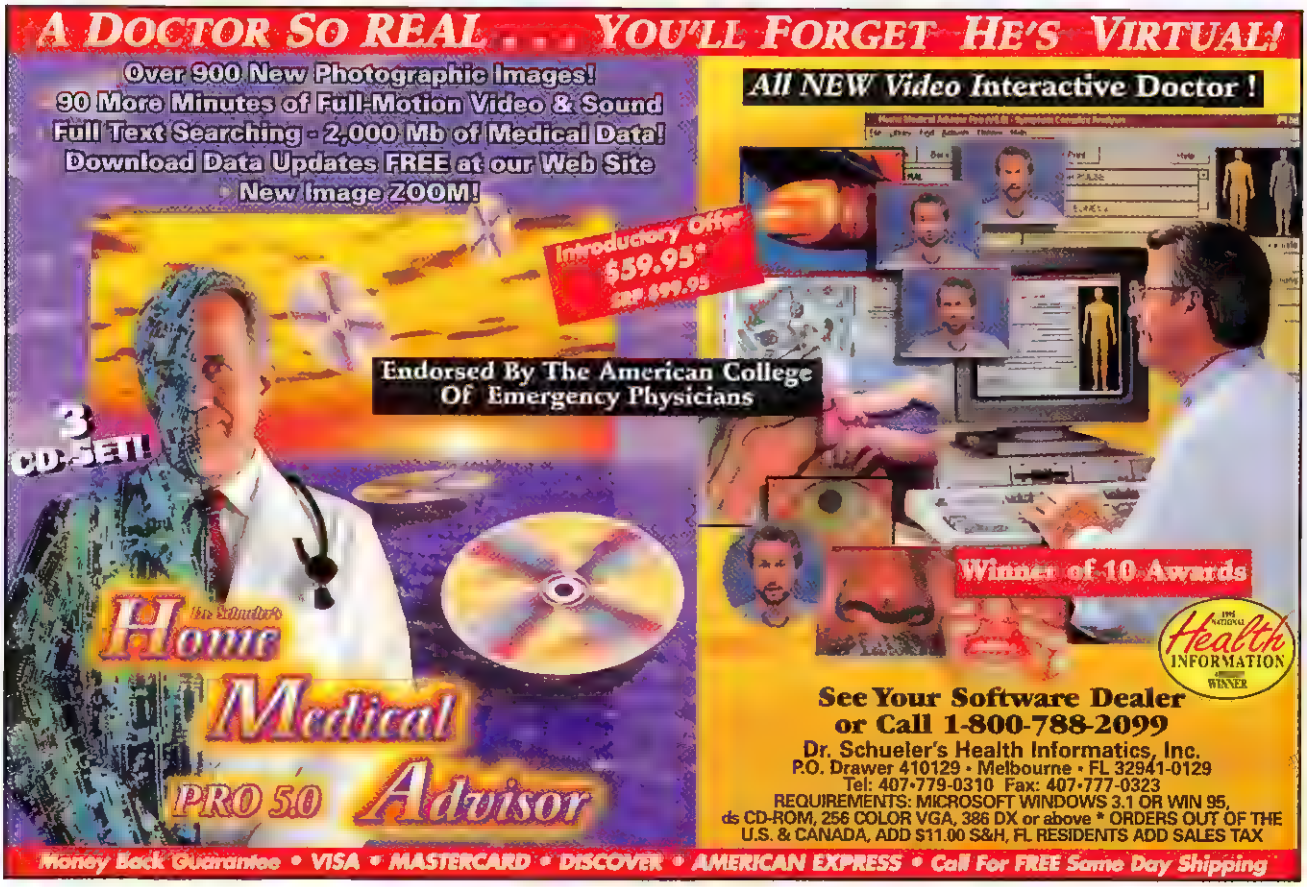
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INTERNATIONAL STUTTER-STEPS

In a turbulent round of hissy fits, door-slamming and all-around hurt feelings, **Ill-Conceived American Business Machines** lost its director of sales and marketing to **Unadulterated British Crap**, which in turn lost its senior product manager to **The Japanese Salary Man In the Plastic Bubble**. When all the dust settled, a small Hong Kong chip maker ended up with the **Oakland Athletics' Phil Plantier**, a mere .202 hitter.

Mr. Jones

BREAKING UP IS HARD TO DO

Mountain View's **Five Guys Software** is also losing one of its key players, the **Fourth Guy**, to a mysterious Hollywood content developer. While nothing's yet been confirmed, gossip around the donburi bowl says the Fourth Guy is heading to **Whatever**, a new Web site for listless twentysomethings banked by **Aaron Spelling**. The departure couldn't have come at a worse time for Five Guys Software, which just suffered the embarrassment of netting $82 million in worthless Monopoly money from its late June IPO. When asked who would fill the Fourth Guy's shoes, the company's **Third Guy** sullenly said, "Geez, I don't know, some dude."

P.E. Duke

ANOTHER SHRIMP ON THE BARBIE

The mythical $500 box just got a little cheaper with **Budgietech's** announcement that it will begin shipping a $79 set-top computer in the fourth quarter. Those who've seen the machine in action are unimpressed. Said one product manager of a competing firm, "This so-called 'set-top box' is nothing more than a circa-1970s **Texas Instruments** calculator. They scratched the old logo off and somehow jammed a power cable into it. I just don't know what these guys are trying to pull here."

F. Simmons

A.D. Sage

STICKIN' IT TO THE MAN

Rushing to capitalize on the success of the wildly popular first-person action game *Menendez Brothers Double Dare*, **Brentwood Drive Software** is releasing *Menendez Brothers Double Dare II: Lyle Versus Erik*. The sequel is a departure from the original game, in which the two Menendae team up to fight their way through 33 levels of hardened lifers in a maximum security prison. Employing a completely different engine, *Double Dare II* is a *Toshinden*-style 3D fighting game set 20 years into the future. Lyle and Erik are now the heartless leaders of opposing prison gangs and command teams of maytags to assault and dehumanize each other in a tournament setting. **Fulton Wong**, Brentwood Drive's senior creative director, says the sequel will feature 14 different fighters of varying strengths and all the chilling art direction of the original title, save the brutal prison rapes.

Y. Wang

P.G. Locksmith

I. Chong

M. Klein

IMPULSE BUYING

White House advisor and techhead **George Stephanopoulos** will be the product spokesperson for **Fishhead's** new line of multimedia PCs. In lieu of a traditional contract for services rendered, the boyish wonk will receive a single computer. "I saw it at CompUSA and didn't really want to wait for all those lame contract negotiations, so I told my agent to cut a deal," Stephanopoulos said. "It's really cool. It comes loaded with *Duke Nukem 3D* and a totally boss sound card. I'm gonna make a remix of Coolio's *Gangsta's Paradise* and send it to my friend Billy Meyers in Dallas."

H.H. Blacksmith

S. Moroni

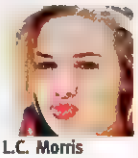
CHIN UP, LITTLE SOLDIER

And now let's all show a round of support for **Cedric Allen**, CEO of **PoopDeck**, who killed a family of five when he became engrossed in a cell phone conversation and drove his prized hunter green Maserati into oncoming traffic. Allen suffered a case of minor whiplash, but the dreamy car was totaled. We're here for you, Ceddy. All you have to do is call.

G.A. Greenberg

MUST-SEE TV?

Livingston Mathematics has announced that it will buy advertising time during *Friends* and *Seinfeld* to trumpet its new line of algorithmic decomfibulation products. True to form, Livingston's decision to buy the time was based on statistical analysis: A recent survey indicates nine out of 10 decomfibulation engineers watch NBC's Thursday night lineup; eight out of 10 think **Courtney Cox** has "got it going on"; and seven out of 10 think **Julia Louis-Dreyfuss** is not only "all that" but also a "bag of chips." Unfortunately, the survey did not reveal the percentage of deconfibulation engineers who have no social lives and live vicariously through the dreams of others.


L.C. Morris

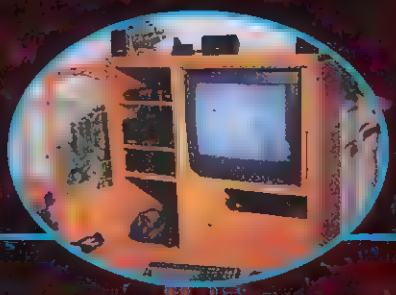
NOW *THAT'S* R&D

RinkyDink Inc. has announced that it will press charges against the corporate spy from **Despondent Cubicle Workers United** who attempted to steal the coveted Eggbert communications technology. While details are still murky, it appears that Eggbert uses inexpensive cotton-fiber cabling to transmit data packets between proprietary input-output devices. The handheld devices are cylindrical, and can be manufactured from either tin or aluminum. **Edith Agnew**, RinkyDink's director of product development, says Eggbert is a particularly effective bandwidth solution for communication between tree forts and bedroom windows.

D. and G. Burnes

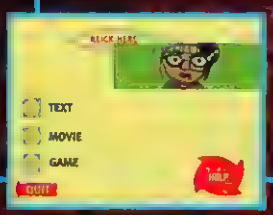
COMING NEXT MONTH

The next **big** issue of boot magazine, promises to deliver even **more** of the news, reviews, previews, and views you **crave** when you want to feed your **need** for all things PC.



The Migration Habits of the North American PC

Time was when the lowly PC was confined to a nook in the den, relegated to a tiny monitor and condemned to tinny speakers. Now, companies such as Gateway and NetTV want to liberate your PC to the living room, taking advantage of mondo-sized monitors and stereo-system caliber sound. But at what cost does this luxury come? The compromises range from dot pitch to expansion slots. But some say surfing the Web from the sofa is the future of the PC. We get hands on and blabber about the new gear.



Multimedia Manifestos

When the Web doesn't deliver the bandwidth you need for your own brand of personal expression, think *true* multimedia. We will reveal the secrets of the professionals for planning your project, digitizing video, sampling audio, rendering 3D, creating animations, and then wrapping the whole bundle together into a simple, but elegant, executable. "But I haven't got access to a CD-R," you whine? Never you mind. *boot* breaks down the process so anyone can create their own multimedia manifestos, whether destined for CD-R, Jazz, Zip, or Syquest cartridge. Heck! You can even just allocate a partition of your gig drive for your masterpiece.

bootWorthy: CD Changers

One is never enough (at least until DVD becomes a reality), so consider the joys of CD changers for your multimedia and gaming pleasures. *Phantasmagoria* need never pop your drive door open again. That mega-ultra phone directory of North America (y'know... the one with the home phone, name, age, income, hair color, and family history of every person ever born on the continent) is now at your fingertips without shuffling through stacks of polymer discs. *boot* looks at every single changer ever made, but only recommends the best.

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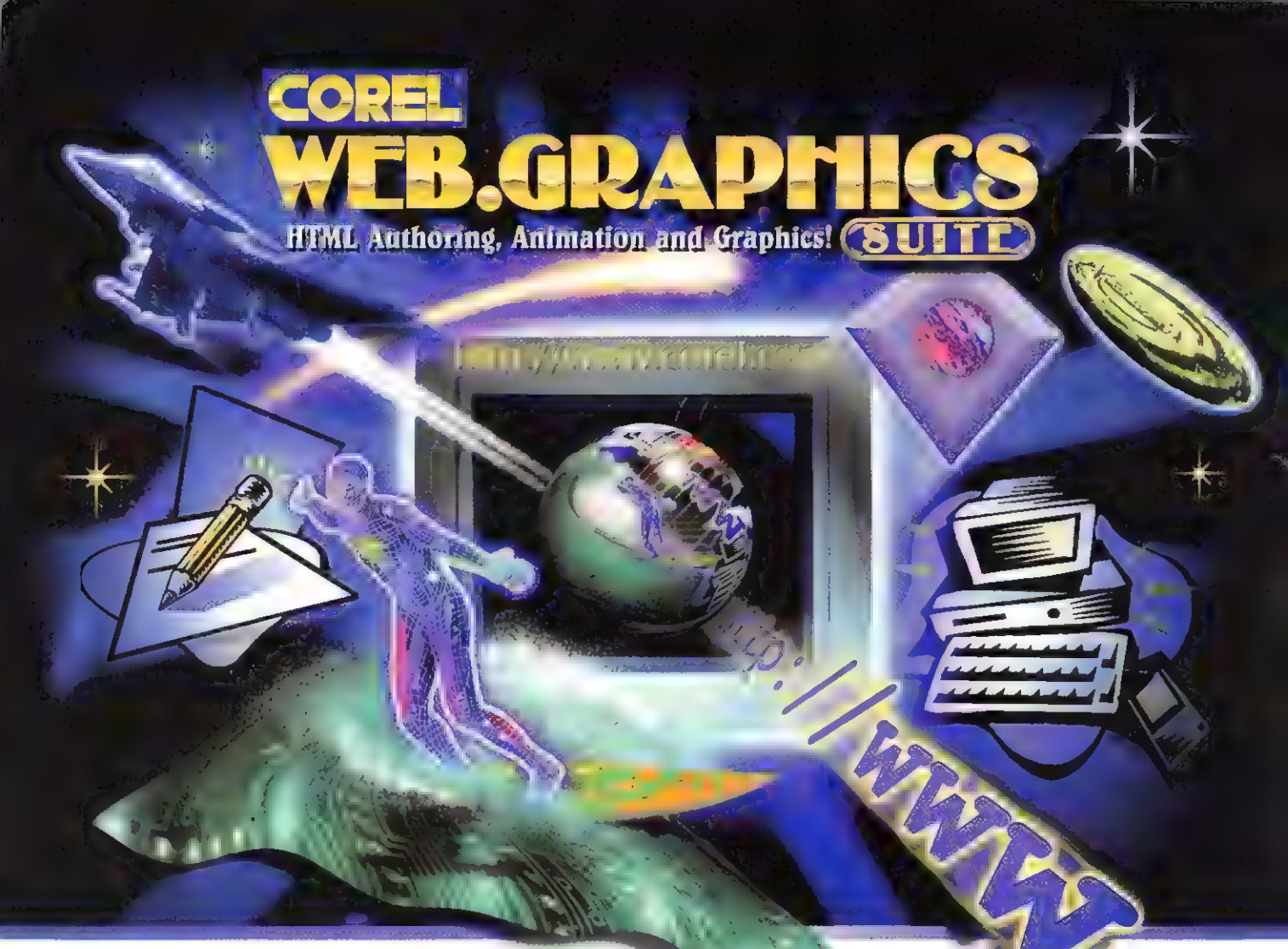

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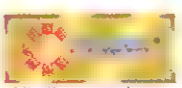

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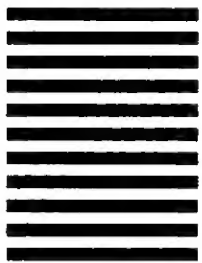

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